

THE AMERICAN PSYCHOLOGIST

THE AMERICAN PSYCHOLOGICAL ASSOCIATION, INC.

GENERAL ANNOUNCEMENTS

HOTEL RESERVATIONS: Hotel reservations should be requested immediately. See the March, 1948, *AMERICAN PSYCHOLOGIST* for a list of hotels, but do not write to the hotels directly. Write to the Housing Bureau, Convention Bureau, Boston Chamber of Commerce, 80 Federal Street, Boston 10, Massachusetts, telling them that you are attending the APA meeting. State your first, second, and third choice of hotel, when you expect to arrive, when you expect to leave, and who will share your room with you. All single rooms have already been reserved.

TRANSPORTATION: *By automobile:* from New York, take Merritt Parkway to New Haven, Route 5 to East Hartford, and Routes 15, 20 and 9 to Boston. From the west via Albany, take Route 2 (Mohawk Trail) to Boston, or Route 20, via Pittsfield and Springfield, to Boston.

By bus: the Greyhound Lines terminal is across the street from the Hotel Statler.

By train: from the south and west through New York City, take the Pennsylvania R. R. and connections (ask for Hell Gate Bridge routing), or transfer to the New York, New Haven and Hartford R. R. at Grand Central Station. From the north and west take Boston and Albany R. R. through Albany and Springfield, or the Boston and Maine R. R. via the Hoosac Tunnel Route.

The Back Bay Station of the New York, New Haven and Hartford R. R. and the Huntington Avenue Station of the Boston and Albany R. R. are three blocks from the Hotel Statler. The Boston and Maine R. R. terminal is at North Station, some distance from the Hotel Statler.

By air: Boston is served by American, Eastern, Northeast, TWA, and United Air Lines.

WEATHER: For September 6 to 11 the average daily *maximum* temperature is 73 degrees. The average *minimum* temperature is 57 degrees. Forty per cent of the days are completely clear at that time of year; 30 per cent have some rain.

REGISTRATION: Please register promptly on the mezzanine floor of the Hotel Statler. Information and a registry of members attending the meeting will be available there.

TIME: All meetings will be on Eastern Daylight Time.

MEALS: Restaurants in the Hotel Statler and other hotels will be open for all meals. Special luncheons and dinners may be arranged by writing to Irving C. Whittemore, College of Business Administration, Boston University, 685 Commonwealth Avenue, Boston 15, Massachusetts.

TICKETS FOR SPECIAL LUNCHEONS AND DINNERS: Tickets for special luncheons and din-

ners must be purchased at the registration desk as soon after arrival as possible. No tickets will be sold at the luncheon or banquet.

PROGRAMS: Additional copies of this program will be on sale at the registration desk.

LOCAL INFORMATION: The Committee on Local Arrangements will have available at the registration desk descriptive information concerning restaurants, places of interest in Boston, additions to or changes in the program, and similar matters.

PRESS ROOM: Parlor E on the mezzanine floor of the Hotel Statler will be used as a press room.

APA HEADQUARTERS: The APA office will be located in Parlor F on the mezzanine floor of the Hotel Statler. The Personnel Placement Service will be open from 9:00 A.M. to 5:00 P.M. Tuesday through Friday and from 9:00 A.M. to noon on Saturday. Registration forms may be secured by those seeking positions. Information about possible candidates will be available for those with positions to be filled.

REQUEST FILMS: In addition to the sessions of research and instructional films scheduled in the program, the Hancock Room on the mezzanine floor of the Hotel Statler will be available continuously for request showings of films presented on the scheduled programs and other films including those of the Psychological Cinema Register. I. C. Boerlin of the Psychological Cinema Register will be in charge of special screenings.

LOCATION OF MEETING ROOMS: With the exception of a few sessions specifically mentioned in the program, all meetings will be held in the Statler Hotel. All meeting rooms are on the mezzanine floor except the Salle Moderne which is located on the floor below the main lobby.

EXHIBITS: Exhibits of books and psychological apparatus will be located on the 5th floor of the Hotel Statler.

LOCAL ARRANGEMENTS: Send questions concerning local arrangements to IRVING C. WHITTEMORE, Chairman of the Committee on Local Arrangements, College of Business Administration, Boston University, 685 Commonwealth Avenue, Boston 15, Massachusetts. Other members of the committee and the features for which each is responsible are: EDWIN B. NEWMAN, exhibits; J. GARTON NEEDHAM, information on recreation and entertainment; MASON HAIRE, publicity; REV. JAMES F. MOYNIHAN, transportation; JOHN L. KENNEDY, registration and headquarters facilities; and EDITH B. MALLORY, hall scheduling.

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THE AMERICAN PSYCHOLOGIST

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Volume 3

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Number 7

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PUBLICATIONS OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION

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PSYCHOLOGICAL MONOGRAPHS: GENERAL AND APPLIED

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PSYCHOLOGICAL REVIEW

Editor: CARROLL C. PRATT, *Princeton University*. Contains original contributions of a theoretical nature; bi-monthly. Subscription: \$5.50 (Foreign \$5.75). Single copies, \$1.00.

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PROGRAM

AMERICAN PSYCHOLOGICAL ASSOCIATION

BOARD OF DIRECTORS, APA

9 AM, Monday

Motivation and Reward in Learning. *Neal E. Miller* (Presented by Psychological Cinema Register)

JOINT MEETING OF COMMITTEE ON PUBLICATIONS AND BOARD OF EDITORS

8 PM, Monday, Headquarters Suite

POPULAR REQUEST PROGRAM: PROGRESS REPORT ON PERSONALITY STUDIES OF GRADUATE STUDENTS IN CLINICAL PSYCHOLOGY

11:10 AM, Wednesday, Ballroom

HAROLD M. HILDRETH, Chairman

CONFERENCE OF AFFILIATED STATE ASSOCIATIONS

8:50 AM, Tuesday, Parlor B

Business Meeting

E. Lowell Kelly and Donald W. Fiske, University of Michigan

POPULAR REQUEST SYMPOSIUM: THE ROLE OF PSYCHOLOGISTS IN THE ESTABLISHMENT OF BETTER HUMAN RELATIONS

10:00 AM, Tuesday, Ballroom

Gordon W. Allport, Harvard University
Gardner Murphy, College of the City of New York
Goodwin Watson, Teachers College, Columbia University

POPULAR REQUEST SYMPOSIUM: SYSTEMATIC IMPLICATIONS OF HULL'S LEARNING THEORY FOR THERAPY

1:40 PM, Wednesday, Ballroom

John Dollard, Yale University
O. Hobart Mowrer, University of Illinois
J. B. Rotter, Ohio State University
Franklin J. Shaw, Purdue University

CONFERENCE OF AFFILIATED STATE ASSOCIATIONS

1:40 PM, Tuesday, Salle Moderne

Presidential Address: John Gray Peatman: Psychologists Need Strong State Organization

THE COMMITTEE ON TRAINING IN CLINICAL PSYCHOLOGY

2:50 PM, Wednesday, Parlor B

Informal Report and Open Discussion of Administrative Problems

MEETING OF COMMITTEE OF UNIVERSITY DEPARTMENT CHAIRMEN

2:50 PM, Tuesday, Parlor D

MEETING OF THE COUNCIL OF REPRESENTATIVES OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION, FIRST SESSION

8:00 PM, Wednesday, Parlor A

SELECTED INSTRUCTIONAL FILMS

7:00 PM, Tuesday, Assembly Room

Arranged by the Audio-Visual Aids Committee

A. Clinical Psychology Films:

The Feeling of Rejection—Canadian Film Board.
G. G. Stodgill (Presented by Psychological Cinema Register)

Shades of Gray—U. S. Army (Introduced by Elias Katz)

B. Public Information Films (Comparative Psychology)

The Jackson Hole Wildlife Park. C. R. Carpenter (Presented by the New York Zoological Society)

C. General Psychology Instruction

Fidelity of Report. Wilbert S. Ray. (Presented by Psychological Cinema Register)

ADDRESSES BY INVITATION: PSYCHOLOGY AS VIEWED BY NON-PSYCHOLOGISTS

8:15 PM, Wednesday, Georgian Room

ERNEST R. HILGARD, President-Elect of the APA, Chairman

Psychology and Medicine. Alan Gregg, Director for the Medical Sciences, Rockefeller Foundation, New York City; Chairman, University Commission to Advise on the Future of Psychology at Harvard.

Psychology and Anthropology. Clyde Kluckhohn, Professor of Anthropology, Department of Social Relations, Harvard University.

STUDENT AFFILIATE MEETING

8:50 AM, Thursday, Parlor B

FRANCIS P. ROBINSON, Chairman

MEETING OF THE COUNCIL OF REPRESENTATIVES OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION, SECOND SESSION

1:40 PM, Thursday, Parlor A

PRESIDENTIAL ADDRESS

8:15 PM, Thursday, Ballroom

CARL R. ROGERS, Chairman

Donald G. Marquis: Research Planning at the Frontiers of Science

ANNUAL REPORT TO APA MEMBERS

11:10 AM, Friday, Ballroom

DONALD G. MARQUIS, Chairman

Carroll L. Shartle: Report of the Treasurer

Helen Peak: Report from the Council of Representatives

Dael Wolfe: Report of the Executive Secretary for 1948

ORIGINAL FILMS

1:00 PM, Friday, Parlor A

Arranged by the Audio-Visual Aids Committee

Motivation and Reward in Learning, Neal E. Miller

A Study of Twins, H. E. Behrens

The Feeling of Hostility, Canadian Film Board

ADDRESSES BY INVITATION: THE RESPONSIBILITIES OF SCIENCE

8:15 PM, Friday, Georgian Room

DONALD G. MARQUIS, Chairman

Science in Being and Science as General Knowledge.

Robert Oppenheimer, Director, Institute for Advanced Study, Princeton, New Jersey.

Social Sciences and the World Today. Jerome N. Frank, Judge of the U. S. Circuit Court of Appeals, New York.

MEETING OF SECRETARIES AND NEWLY-ELECTED SECRETARIES OF THE APA DIVISIONS

10:00 AM, Saturday, Parlor D

DIVISION OF GENERAL PSYCHOLOGY**GENERAL PSYCHOLOGY**

8:50 AM, Tuesday, Parlor A

DELOS D. WICKENS, Chairman

8:50 AM The relationship between mood and the production of affectively toned associates. W. A. Bousfield, University of Connecticut.

PROBLEM: To test the hypothesis that mood as an attitude facilitates, in proportion to its strength, the production of affectively consistent content.**POPULATION:** 994 college students tested over a three-year period.**PROCEDURE:** Groups of 12 to 120 students were asked individually to give ratings on a +5 to -5 basis of their mood, defined as *how well you feel*. They were also instructed to list on paper verbal associates of the following categories: 1. pleasant items; 2. unpleasant items; 3. affectively neutral items. The experimenter gave signals at successive 2-minute intervals at which each subject indicated his progress by underlining the last item he had written. The listings were continued for periods of 16 to 18 minutes.**RESULTS:** Plots showing the relationship between the average cumulative totals of items and the time devoted to their production conformed to the modified exponential equation:

$$n = c(1 - e^{-at})$$

In this function, n = total number of items, c = constant, e = base e of natural logarithms, and t = time. Analysis of the data indicated that pleasantness of mood was reliably and positively correlated with the production of pleasant associates. Ratings of mood were not significantly related, however, to the production of either unpleasant or affectively neutral items.**CONCLUSIONS:** The original hypothesis may be said to apply to the production of pleasantly toned items, but not to the production of unpleasantly toned items. In order to account for the results it is plausible to assume the operation of some sort of mechanism of *isolation from affect* in the case of the production of unpleasantly toned material.

9:05 AM The role of a psychologist as a citizen.
Robert H. Seashore, Northwestern University.

The constitution of the APA states that our purpose shall be "to advance psychology as a science, as a profession, and as a means for promoting human welfare." Though we have numerous divisions for the promotion of scientific and professional interests we have, as yet, relatively few organized approaches to the promotion of human welfare except at the level of individual counseling. Furthermore, although the possible applications of psychology to everyday life represent the largest single area of probable usefulness to students of psychology, we have largely neglected their education for effective participation and leadership as members of a community.

The present study is concerned with the welfare of citizens as members of a community, in which the various civic boards are ordinarily the largest single businesses in the community, providing its public utilities, education, libraries, recreation, fire and police protection and other major group needs.

Observations are based upon six years of participation in these community organizations: (1) the civic caucus for the selection and election of qualified civic board members, (2) the Board of Education, (3) the Civic

Planning Board, (4) an informal Community Council representing all civic organizations.

The principal findings are those of the practical methods developed by the citizens of a medium sized community for dealing with the typical difficulties encountered in dealing with four major aspects of community leadership: (1) the democratic selection and election of qualified civic officials, (2) the training of these officials on the job as effective board members, (3) the development of effective procedures for planning to meet civic needs, and (4) securing public support to put the civic plans into action.

A psychologist finds such activities a living laboratory for the application of his knowledge of clinical, personnel, social and business psychology as well as an opportunity to adapt scientific methods to problems of everyday living.

PRESIDENTIAL ADDRESS

10:00 AM, Tuesday, Parlor A

EDWARD C. TOLMAN: There Are Two Kinds of Learning
 Business meeting following

DIVISION ON THE TEACHING OF PSYCHOLOGY

PRESIDENTIAL ADDRESS

1:40 PM, Wednesday, Parlor D

Sidney L. Pressey: The Place and Functions of
 Psychology in Programs of Higher Education

Business meeting following

SYMPOSIUM: PROBLEMS OF TEACHING AT THE COLLEGE LEVEL

8:50 AM, Friday, Parlor A

Organized jointly by the Division on the Teaching of
 Psychology and the Division of Educational
 Psychology

WILLIAM A. HUNT, Chairman

Claude E. Buxton: Training for college teaching

C. R. Carpenter: Teaching aids

D. B. Harris: Methods in a general college

J. E. Horrocks: "Progressive education" in college
 teaching

Maurice E. Troyer: Fields experience

Ronald Lippitt: Group methods

R. S. Crutchfield: Honors programs

THE TEACHING OF PSYCHOLOGY

Volunteered papers selected by the division

4:00 PM, Friday, Parlor A

ELIZABETH DUFFY, Chairman

4:00 PM Student preferences concerning teaching
 method and class structuring. *Esther Milner, Uni-*
versity of Chicago.

PROBLEM: To ascertain the type of teaching method and
 degree of class structuring preferred by two groups of
 college students given the same subject matter (a course
 in Social Psychology) but taught differently.

POPULATION: Two groups of college students at the
 sophomore level, 22 in Class I and 16 in Class II.

PROCEDURE: The informal discussion-group method of

instruction was used in both Class I and Class II, but a more directive role was taken by the instructor with Class II. The course outline and reading assignments were the same for both groups. Class I was student-structured from the first day with regard to the respective responsibilities of instructor and students, required assignments and grading, while Class II was teacher-structured in regard to these same points. Class I became as a result far more permissive in atmosphere and far less structured in terms of externally-imposed controls and requirements than was Class II. Both groups took the same three tests during the course of the quarter, Class I doing so on a voluntary basis, with similarity in the performance of both classes on all three tests.

At the end of the quarter, both groups anonymously evaluated the course in accordance with a prepared "Course Evaluation" outline. This paper is based chiefly on material derived from this student evaluation.

RESULTS AND CONCLUSIONS: The results would seem to corroborate from the student point of view those studies in the literature which indicate the greater effectiveness of group discussion to lecturing as a teaching medium. They would also seem to indicate that most of these students do not prefer a completely permissive class structuring: they feel they can gain more from course material when some type of external controls, intellectual and formal, are imposed upon them.

Some of the implications for teachers of psychology of this and related studies in the literature will be discussed.

4:15 PM The preparation of a visual aids series for the elementary psychology course. *Robert S. Harper, Harvard University, D. M. Neu, Psychological Corporation, and Ned L. Reglein, John Wiley and Sons.*

The interest shown during the last few years in the use of visual aids led to the consideration of the problems of constructing a set of visual aids to be used in the teaching of elementary psychology.

The comments of psychology instructors from both large and small institutions indicate that the cost in time, effort, and expense have made it difficult for individual departments to acquire adequate sets of visual aids. Present materials seem to contain some subject matter which the instructor can not effectively coordinate with the class discussion. This may be due to such things as the length of the material and the inclusion of extraneous information. Other factors are the difficulty of setting up bulky equipment and the problem of projection facilities.

With these facts in mind, the present program was planned to provide the instructor with supplementary demonstration material which is: (1) readily available; (2) easily utilized; and (3) of a participational nature.

A new elementary psychology textbook was selected and the chapters rated on a five-point scale as to the

adaptability of the subject matter to visualization. After the important topics in each chapter had been selected, the most effective means of presentation was agreed upon. This involved deciding between slides and motion pictures, color and black-white, and graphs, pictures and photographs.

Although much new material was included, this was not to the exclusion of already existing subject matter of the classical type. The resulting visual aids set consists of approximately 200 color and black-white slides, and a half-dozen motion pictures. (Slides and Films)

4:30 PM The program for the teaching of psychology at the United States Military Academy. *T. Ernest Newland, University of Tennessee.*

As a result of the suggestion in 1946 by the Army Chief of Staff, the teaching of a course in the psychology of military leadership was inaugurated at the United States Military Academy at West Point. This represented the first time psychology, as such, was taught, with the full-time cooperation of a professional psychologist, in any service academy. The organization, the scope of the course, and certain evolving psychological opportunities are described.

4:45 PM Teaching projective techniques in an academic setting. *Irving Arthur Fosberg, Tulane University.*

PROBLEM: The formulation of a method of teaching a two semester course in Projective Techniques in a graduate school of psychology.

THESIS: It is possible to teach a successful course in projective techniques in the graduate school of psychology. Such a course should provide for lecture time, laboratory time and for individual consultation time with the students. The lectures should be devoted (a) to the exposition of the theory and principles of projective techniques, (b) to the discussion of the historical development of each of the several testing methods, and (c) to the discussion of the validity and reliability of each projective test method studied. The laboratory time should be spent in teaching test administration, scoring and interpretation. The individual consultation time should be spent in private coaching with special emphasis on interpretation.

The students who can most profit from such a course are second year graduate students in the clinical psychology program who have had courses in tests and measurements, statistics, experimental, abnormal, and psychodynamics. Also to be discussed will be the problem of the choice of text books, case material coverage, the number of topics to be treated in class as compared to the total area of projective techniques, intensive vs. extensive treatment of projective tests, the theoretical framework which such a course needs, and the place of a course in projective techniques in the graduate clinical psychology program.

DIVISION OF THEORETICAL-EXPERIMENTAL PSYCHOLOGY AND DIVISION OF PHYSIOLOGICAL AND COMPARATIVE PSYCHOLOGY

BUSINESS MEETINGS

8:00 PM, Tuesday, Room 201, Memorial Hall, Harvard University

Division of Theoretical-Experimental Psychology

8:00 PM, Tuesday, Room 205, Memorial Hall, Harvard University

Division of Physiological and Comparative Psychology

PRESIDENTIAL ADDRESS

9:00 PM, Tuesday, Room 201, Memorial Hall, Harvard University

Clifford T. Morgan: Learning Theory from the Standpoint of Brain Functions—and Vice Versa

Smoker for the Divisions of Theoretical-Experimental and Physiological and Comparative Psychology

LEARNING I

8:50 AM, Wednesday, Georgian Room

Volunteered papers selected by the division

EDNA HEIDBREDER, Chairman

8:50 AM Some comments on perceptual organization as the theoretical basis of learning. *R. H. Waters, University of Arkansas.*

Some recent discussions of the nature of learning theory have emphasized the role of perceptual organization as the fundamental process in learning. Perceptual organization is claimed to be the primary, and reinforcement a secondary, process. The paper examines this claim. It suggests the following criticisms against the theory: (1) Perceptual organization is too narrow a concept to account for all forms of learning. (2) The character of perceptual organization is a function of the prior presence of needs or drives within the organism. (3) The establishment of perceptual organization adequate for the control of behavior requires the concept of reinforcement. (4) Though the distinction between learning and performance is theoretically valid, experiments have not satisfactorily established the fact that either can take place in the absence of some form of reinforcement. As a result of these criticisms, for which experimental evidence from the literature will be cited, it is concluded that perceptual organization is not the sufficient cause or conditions of learning.

9:05 AM Spread of the isolation effect in serial learning. *Moncrieff H. Smith, Jr., Harvard University.*

PROBLEM: To determine the effect of the isolation of a single word in the learning of a 13-unit list of adjectives. **POPULATION:** Forty undergraduates from Harvard or Radcliffe.

PROCEDURE: Materials were presented on a Gerbrands Memory Drum. Lists were typed in black on white paper, and isolation was achieved by typing one item in red ink. The isolated item was always in the eighth position in the list. Each subject had one practice session, and one experimental session in which he learned a homogeneous list and a list with one isolated item. Practice effects and list differences were counterbalanced in the experimental session.

RESULTS: Lists containing an isolated item required as many trials for learning as did the homogeneous lists.

Comparison of the serial position curves for the two conditions showed that isolation increased the relative frequency of correct anticipation, not only of the isolated item, but of the items on either side of it. At all other points the serial position curve for the isolated condition fell below that for the homogeneous condition. **CONCLUSIONS:** Isolation by virtue of adventitious factors, such as the color of the isolated item, seems to produce a redistribution of effort on the part of the subject, without any appreciable change in the over-all learning.

The spread of the isolation effect to adjacent items is interpreted as being in opposition to Zirkle's hypothesis of spread of isolation in the spread of effect situation. In both cases the effect is to increase frequency of response repetition, but in the present experiment the repeated responses are correct ones, whereas in the spread of effect experiment incorrect responses are repeated as a consequence of their proximity to an isolated response.

Ellen G. Stearns collaborated in this experiment. (Slides)

9:20 AM Interaction of meaningfulness and length of rest interval as factors in measured reminiscence. *Claude E. Buxton, Northwestern University.*

PROBLEM: To compare retention curves for syllables and for adjectives learned and recalled under comparable conditions.

POPULATION: Two separate groups of 18 college students each.

PROCEDURE: Sixteen-item lists of adjectives and of syllables were constructed for serial anticipation learning. Four practice sessions, then six experimental, with a constant order of lists, were used. During the experimental sessions, for each group (type of material), there

was a control (no-rest) recall interval, and experimental rest intervals of 30 sec., 2, 5, 10 and 20 min. Random orders of conditions were used. The pre-rest criterion was always 16/16. During rest *S* scanned light magazines, being instructed not to rehearse. All lists were presented on a rear-projection screen with a cam-driven SVE projector. The exposure rate was 2 secs., with 6 secs., between trials.

RESULTS: As length of rest interval increased, recall of the syllables first increased reliably, then decreased reliably at 20 min. By contrast, recall of adjectives first improved unreliably as length of rest interval increased, and then decreased unreliably by 20 min. (These statements were supported by analysis of variance for the two groups separately.) Exact comparisons of trends in the two experiments can not be made because of heterogeneity of variance (Bartlett's test), but the trend of means is clear qualitatively.

CONCLUSIONS: As for Ward, reminiscence occurs reliably in syllables, over short retention intervals; forgetting soon ensues. As for Melton and Stone, reminiscence does not occur reliably in adjectives, but the present study shows no reliable evidence of forgetting either. The difference between the two retention curves lends support to an explanation of reminiscence based on intra-serial generalization.

9:35 AM Learning of probable occurrences. *James S. Calvin, University of Kentucky.*

PROBLEM: How does learning vary with differing degrees of intermittent reinforcement?

POPULATION: 300 students in introductory psychology classes.

PROCEDURE: Five different combinations of lights were exposed, one at a time, 24 times each during a learning series of 120 trials. One of these combinations (termed S_1) was followed intermittently by a buzzer. The other four light combinations (termed S_2) were also followed intermittently by a buzzer, but in a lesser proportion of trials than for S_1 . Examples of reinforcement patterns employed were: 100% (for S_1) vs 0% (for S_2); 87½% vs 12½%; 75% vs 12½%; 50% vs 25%; etc. The subject's tasks were (1) to predict, when a light combination appeared, whether the buzzer would follow, and (2) to indicate his certainty regarding his prediction on a 1-to-5 scale.

RESULTS: Results were analyzed in order to determine the effects of varying reinforcement patterns on learning to respond to S_1 , learning to respond to S_2 , learning to respond differently to S_1 and S_2 . Results indicated that certainty measures of learning closely parallel frequency measures. Most effective learning was obtained when proportion of reinforcement was high for S_1 , low for S_2 . Progressive decreases in learning were obtained with decrease in proportion of reinforcement for S_1 and with

decreasing differences in reinforcement levels (between S_1 and S_2). Learning to respond to S_1 depended, not only on level of reinforcement for S_1 , but also on level of reinforcement for S_2 ; this latter relationship does not appear simple, however.

CONCLUSIONS: The findings indicate that in an expectation learning situation involving differing probabilities of occurrence, learning to respond to S_1 is influenced by a number of factors, including percentage of reinforcement S_1 has received, percentage of reinforcement S_2 has received, and difference between these percentages.

BRAIN FUNCTIONS

10:00 AM, Wednesday, Georgian Room

Volunteered papers selected by the division

DONALD B. LINDSLEY, Chairman

10:00 AM Effects of electroshock convulsions on learning and retention as functions of the difficulty of the task. *Roger W. Russell, Western State Psychiatric Institute and Clinic and Robert A. Patton, University of Pittsburgh.*

PROCEDURE: A series of experiments in this laboratory (Braun, Russell and Patton) has indicated that significant decrements in both learning and retention follow a series of controlled electroshock convulsions when the task involved is a five-choice-point maze. In the present study 120 subjects were exposed to exactly the same experimental conditions as in the previous research series except that their behavior in learning and relearning two tasks of lesser difficulty—a straightaway and a single choice-point-maze—was studied. The subjects were divided into eight equivalent groups. Group 1 received 25 daily electroshock convulsions and 24 hours following the last convulsion began practice on the straightaway. Time records were kept for each of 25 trials. Twenty-four hours following the last trial, practice on the single choice-point maze began. Group 2 served as controls. Group 3 was treated exactly the same as Group 1 with the exception that a 30-day rest period intervened between the last convulsion and the start of practice on the straightaway. Group 4 served as its controls. Group 5 received preliminary practice on the straightaway and learned the maze prior to receiving its series of convulsions. Twenty-four hours after the last convulsion relearning trials began. Group 6 furnished controls for this phase of the research. Group 7 received the same treatment as Group 5 except that a 30-day rest period followed the last convulsions before relearning started. Group 8 served as its control.

RESULTS: No significant differences were found between any of the control and experimental groups in their behavior on the straightaway or in the single-choice point maze.

CONCLUSIONS: The results indicate that the effects of electroshock convulsions on learning and retention are functions of the difficulty of the task involved.

10:15 AM Deficits in maze learning by rats tested from two and one-half to three months after a course of electroconvulsive shocks. *Calvin P. Stone, Stanford University.*

PROBLEM: To determine whether there is a long-time deficit in the maze-learning ability of rats given electroconvulsive shocks in infancy.

POPULATION: Fifty-six white rats: 29 experimentals and 27 littermate controls.

PROCEDURE: In the age period of 20 to 30 days, half of the members of each litter were given daily electroconvulsions. From birth until the end of the experiment, all animals were handled nearly every day to minimize the likelihood of fear responses continuing after the convulsion series. From 75 to 90 days after the last shock, all animals were trained on the Stone multiple-T maze, two trials daily for 20 days. Rats not satisfying the criterion of 3 successive perfect trials were trained for 6 more days, one trial per day.

RESULTS: Comparing the total number of errors made on 40 trials, the mean of the experimental group was 139.8, and of the control group, 111.3. The probability of such a difference arising by chance is .05.

The corresponding comparison for trials 31 to 40 gives means of 14.6 for the experimentals and 7.2 for the controls. This difference is reliable at the .02 level.

The percentage of animals satisfying the criterion of mastery was greater in the control group. Sixty-seven per cent of the controls met the criterion, as against 31 per cent of the experimentals. This difference is reliable at the .01 level.

Despite these differences, the distributions overlapped almost completely.

The data are not yet completely analyzed.

CONCLUSIONS: A series of electroconvulsions given rats in infancy produced a deficit in maze learning which could be demonstrated more than 75 days after the last convulsion. It is believed likely that this reflects a permanent reduction in maze learning ability.

This experiment was carried on in collaboration with Mr. Paul B. Porter.

10:30 AM Conditioning involving the two body sides after hemidecortication. *W. N. Kellogg, Indiana University.*

The present investigation was designed to ascertain the effect of removal of one-half of the neocortex upon the buzz-shock flexion conditioning of both sides of the body. Six laboratory dogs with complete or nearly complete ablation of the cortex of one cerebral hemisphere served as subjects. The animals were supported during

training by means of leg-slings and hammocks, so that they were free to lift any or all of the feet.

The conditioned response training was both bilateral and unilateral. In the bilateral procedure the conditioned buzz was followed by a reinforcing electric shock delivered simultaneously to each of the hind feet. In unilateral conditioning, the shocks were delivered to the right hind foot for a series of trials, then to the left hind foot, again to the right hind foot, and so on. The ease of transfer of the CR from one side to the other was thus observed.

Results show no fundamental difference in the rate or efficiency of learning on the two body sides. Some of the subjects, it is true, learned faster with the normal or unaffected limbs; but others gave superior results with the incapacitated members. The variations are adequately explained by the principle of individual difference, without reference to the cortical insult at all. The only consistent effect of the brain damage seems to have been a slightly longer latency and a slightly greater amplitude for the CRs occurring on the affected body side.

Although hemidecortication produces profound effects in the reflexes, in posture, in locomotion, and in vision in the dog, we can find no evidence that it affects the speed or efficiency of learning of the flexion CR. (Slides)

10:45 AM The effect of bilateral removal of the prefrontal granular cortex on delayed response performance and emotionality in chimpanzee. *Robert A. Blum, Yerkes Laboratory of Primate Biology.*

Removal of the prefrontal areas in monkeys results in loss of the ability to perform delayed response under the usual conditions. Jacobsen found a similar effect in two chimpanzees, as well as loss of emotional responsiveness to frustrating situations. The present experiment was undertaken in order that analysis of the animals' performance on an extensive series of tests might serve better to define the nature of the function which is disturbed. Two chimpanzees, one a preadolescent male and the other an adult castrate female, underwent prefrontal lobectomies. The experiment yielded the unexpected result that both animals were able to achieve a high level of performance on spatial delayed response up to the longest intervals tested (4 minutes for one of the subjects, 1 minute for the other). Prior to operation the young male had been a subject in an experiment on simple matching and generalized matching from sample. His postoperative performance was similar to that of an unoperated control, both showing considerable retention. The prefrontal chimpanzees show marked emotional reactivity to disturbing or frustrating situations without noticeable departure from their preoperative level. These animals are still being tested, so no precise description of the lesion is possible. However, estimations at the time of operation indicate that all the tissue anterior

to a plane 4 to 5 cm. posterior to the frontal pole on the dorsal surface and 1 to 2 cm. posterior to the pole on the ventral surface was removed. (We believe that the posterior margin of this lesion invades the region usually described as areas 8 and 6 of Brodman.) This experiment was done in collaboration with J. S. Blum and Dr. Karl Pribram.

LEARNING II

1:40 PM, Wednesday, Salle Moderne

Volunteered papers selected by the division

B. F. SKINNER, Chairman

1:40 PM An experimental test of the non-selective principle of association of drive stimuli. *Howard H. Kendler, University of Colorado.*

PROBLEM: Rats, trained under simultaneous hunger and thirst drives in a T-maze with water in one goal box and food in the other, were found to respond appropriately during test trials when motivated either by hunger or thirst. One explanation assumed that the subjects developed distinctive anticipatory eating and drinking responses prior to their experimental experiences. This study provides a test of this hypothesis by subjecting animals raised on a liquid diet (thereby precluding the development of distinctive anticipatory eating and drinking responses) to essentially the same experimental situation.

POPULATION AND PROCEDURE: Because seven white rats raised on a milk-iron-copper liquid diet refused water, it was necessary to modify the maze situation so that a milk-water solution appeared in one goal box, while dog checkers appeared in the other. During the training series both the experimental (13 rats raised on a liquid diet) and the control (12 animals raised 'normally') groups had equal experiences with the contents of both goal boxes. The test trials for both groups consisted of one daily trial following deprivation of either food or the milk-water solution.

RESULTS: During the test series the performance of the experimental and control groups were essentially similar. The percent of appropriate responses in both groups could be attributed to chance. However, two subjects in each group gave definite evidence of having learned to respond appropriately.

CONCLUSIONS: Due to the similarity of the performance of the control and experimental groups, and the ability of some experimental animals to learn the problem, the data are interpreted to be inconsistent with a non-selective principle. The results of this and other experiments are discussed in terms of a selective principle of association which asserts that only those drive stimuli which are themselves reduced become connected to rewarded responses.

1:55 PM Response latency as a function of the amount of reinforcement. *David Zeaman, Brown University.*

PROBLEM: To determine: (1) The functional relationships between the amount in grams of a positive reinforcement and one or more parameters of empirical acquisition and extinction equations containing latency of response as dependent variable; (2) the effects of a change in amount of reinforcement on latencies late in the stages of acquisition.

POPULATION: 101 male albino rats.

PROCEDURE: 7 groups of 8 or more animals were given well-spaced training (1 trial-a-day) on a simple elevated runway (Graham-Gagné type) with amounts of food reinforcement weighing .05, .20, .40, .60, .80, 1.60 & 2.40 grams. When response latencies had reached stable asymptotes (20 trials), the 4 groups receiving .20, .40, .80, & 1.60 grams were extinguished with massed trials.

The groups receiving the largest and smallest amounts had their rewards interchanged and were then given 8 additional daily trials before extinction.

Following acquisition, the 40 animals of the .60 gram group were divided into 5 equated subgroups and given 8 more daily trials with the following amounts: .05, .20, .60, 1.20, & 2.40 grams. These animals were also subjected to massed extinction trials.

RESULTS AND CONCLUSIONS: (1) The family of comparable learning curves generated by the varying amounts of reinforcement differed significantly with respect to equation constants representing the final limit or asymptote of latencies. The parameter representing the rate of approach to these limits remained unchanged. (2) The plot of log latency as a function of log grams of food yielded a curve negative in slope and slightly positively accelerated over the range tested. (3) The greater resistance to extinction of the larger amount groups was indicated by the systematic variation of the extinction equation constants controlling rate-of-approach to the final level. (4) Changes in amount of reinforcement late in acquisition shifted latency asymptotes in the expected direction but to a greater than expected degree. (5) Certain theoretical implications and relations are considered. (Slides)

2:10 PM Preliminary report on a device for the further quantification of operant conditioning. *F. C. Frick and George A. Miller, Harvard University.*

In recent years a large number of experiments have been reported which have involved the lever-pressing response of the rat. On the basis of these experiments a number of general principles of behavior have been derived. At present these principles suffer from a lack of precision and it is apparent that the behavior of the rat in the lever-pressing situation needs further quantification and more detailed analysis.

This work has, for the most part, implicitly assumed

that a fair account of the entire behavioral sequence involved can be obtained by the examination of a single member of the sequence. This assumption seems particularly doubtful under conditions where the response to the lever is not always reinforced. Under these conditions the rate of response to the lever would appear to be partially determined by the presence of discriminative cues and secondary reinforcement, the importance of which have been amply demonstrated by recent studies of Spence and others.

An apparatus has been designed to permit the simultaneous recording of two members of the response chain involved in the lever pressing situation. The lever and food tray have been spatially separated and the latter has been hooked up to a capacity-relay so that a record may be obtained not only of the lever-pressing response but of a later response in the chain-approach to the food tray. Discriminative cues connected with the action of an automatic feeding device can be controlled through adequate masking noises and secondary reinforcement in the form of tones correlated with lever pressing have been put under experimental control.

Preliminary results obtained with this apparatus will be presented. (Slides)

2:25 PM The acquisition of a response to food under conditions of food satiation. *Edward L. Walker, University of Michigan.* (Abstract exceeded 300-word limit)¹

SYMPOSIUM: SCALES OF MEASUREMENT

2:50 PM, Wednesday, Salle Moderne

Organized by the Division of Theoretical-Experimental Psychology, the Division of Physiological and Comparative Psychology, and the Psychometric Society.

SAMUEL A. STOUTER, Chairman

Speakers: S. Smith Stevens, Clyde H. Coombs, Charles I. Mosier

Discussants: Harold Gulliksen, Quinn McNemar, C. F. Mosteller

MOTIVATION AND BEHAVIOR

8:50 AM, Thursday, Georgian Room

Volunteered papers selected by the division

J. G. BEEBE-CENTER, Chairman

8:50 AM The homeostatic systems associated with the primary drives, and their theoretical representation by means of the system-functions (transfer functions)

¹ All abstracts which exceeded the three-hundred word limit are omitted from the program.

of servo-theory. *George L. Kreezer, Washington University, St. Louis.*

In attempts to understand motivated behavior in general, psychologists have found it of value to regard the primary or physiological drives as a point of departure. One approach to an understanding of these primary drives is to regard them as dependent on the homeostatic or physiological regulatory systems of the organism (cf. Cannon, Adolph, Richter, etc.). The present paper describes methods for obtaining a concise theoretical representation of such homeostatic systems in terms of the transfer-function concepts of servo-theory.

In previous reports by the author, the possibility was pointed out of deriving transfer-functions to represent physiological systems on the basis of overall response curves of the total system to special test disturbances, even though detailed data on the organization and components of the system was not available. In the present paper, we are concerned with methods for applying this approach to homeostatic systems specifically, on the basis of the analogy of such systems to the closed-cycle systems of servo-theory.

Two methods will be described for obtaining the necessary overall response curves and the associated transfer functions, based on the temporal form of the deviations of the "regulated variable" from the "set-point", following disturbance of the system. These methods will be illustrated by the treatment of data available on blood-sugar tolerance curves on different animals.

(The work described was carried out during the author's tenure as Guggenheim Fellow at the Institute for Advanced Study at Princeton, N. J., and with the aid of a grant from the Penrose Fund of the American Philosophical Society). (Slides)

9:05 AM Studies on the early development of social behavior in puppies. *J. P. Scott, Roscoe B. Jackson Memorial Laboratory.*

PROBLEM: To develop a normal time schedule for behavioral development in dogs, with particular attention to the social relationships involved.

POPULATION: 14 litters from 7 pure breeds and including 57 individuals have been studied intensively up to 16 weeks of age and less intensively thereafter.

PROCEDURE: An attempt was made to develop a routine which would provide an optimum standard environment for all dogs and which would be somewhat comparable to care and training given to human children in home and school. The procedure included daily short-period observations, weekly physical examinations, a standard system of feeding and veterinary care, a general activity test, three performance tests, a test of relationships with human beings, and a dominance test of relationships with other dogs.

RESULTS: Social and physical development of puppies

may be naturally divided into five periods whose approximate length and characteristic activities are listed.

1. Birth until eyes open: neonatal. 0-2 weeks, nursing.

2. Opening eyes until leaving nest. 2-4 weeks. Teeth erupt, walking, special sense organs used. Solid food eaten, fighting play begins.

3. Leaving nest until weaning. 4-10 weeks, physical skill and activity increased, playful fighting, great changes in relationships with human beings.

4. Weaning until sexual maturity. 10 weeks to 8-10 months. Group attacks on one individual in play fights, submission to older dogs, hunting.

5. Maturity.

CONCLUSIONS: The third period of life appears most sensitive with regard to determining the nature of social relationships. Before or after this period, accidents or social training seem to have smaller effects. Individuals show some variation in patterns of development.

The data were collected by Miss Mary-Vesta Marston.

9:20 AM The development of dominance-submissive hierarchy among puppies with attempts to change the position of the submissive animal. *W. T. James, University of Georgia.*

Previous studies have shown that a dominance-submissive hierarchy develops in most litters of dogs. The present study was undertaken to determine how early this difference appears. During the experiment an attempt was made to change the position of the submissive animal.

A litter of four Dalmatian-setter F1 hybrids, one female and three males, were observed in a competitive feeding situation daily from 85 days of age until 5 months of age, and thereafter at intervals until maturity.

A dominance-submissive order was present from the beginning of the experiment. Three dogs, the female and two males, were about equal in dominance, and these dominated the third male, which was extremely submissive. This order remained unchanged until the animals were approximately 115 days of age, when the female became the dominant animal.

The aggressive nature of the submissive animal could be increased temporarily by a dosage of .55 cc of alcohol per kilo given from 8 to 10 minutes before the experiment. This would seem to indicate that psychological factors as well as constitutional factors play a part in the behavior.

Since these dogs were F1 hybrids from pure stock parents we could not expect any great difference in size. From the beginning of the experiment, however, the female was the greatest in size, weighing 7 kilos, with the two dominant males next, weighing 5 and 6 kilos, while the submissive male was the smallest, weighing 3.7 kilos. After the fifth month special care was taken to give the

submissive animal plenty of food. The dog was fed alone as well as with the group. Following this procedure the dog gained weight and soon equaled that of the two dominant males. The submissive nature was still present, however, and the animal was unable to get enough food in the competitive situation.

SECONDARY REINFORCEMENT

10:00 AM, Thursday, Georgian Room

Volunteered papers selected by the division

LYLE LANIER, Chairman

10:00 AM The extinction of a token reward behavior sequence. *Richard L. Solomon and William W. Lambert, Harvard University.*

PROBLEM: In the token reward situation, the amount of work which the subject will do after the removal of primary reward is considered indicative of the strength of the token reward behavior sequence. But different ways of administering the extinction conditions might yield different apparent strengths.

POPULATION: Bright children ($N = 37$), 3-4 years old, both sexes.

PROCEDURE: The experimental group was trained to obtain candy by working at a work machine to obtain poker chips which could then be put into a vending machine which produced candy. A control group received candy directly from the work machine. For the experimental group, extinction was carried out in four ways: (1) the work machine gave its usual noises, but no token; (2) the work machine was shut off; (3) the vending machine gave its usual noises but no candy; and (4) the vending machine was shut off. For the control group, extinction was carried out in two ways: (1) the work machine gave sounds, but no candy and (2) work machine shut off.

RESULTS: The highly reliable results are not predicted by either secondary reinforcement or expectancy theories. For example, extinction took place much more rapidly when the characteristic sounds of the work machine were present in the control group situation, while the reverse of this held in the experimental group situation. Also, the nearer the end of the sequence of behavior, the more detrimental was the introduction of extinction procedure. Again, the click of the machine in the non-token situation was more effective in maintaining behavior than was the poker chip of the token reward situation.

CONCLUSIONS: The token reward situation is much more complicated at the human level than has been indicated by the work of Wolfe or Mitrano. The type of procedure used in extinction is extremely important. (Slides).

10:15 AM A study of motivating conditions necessary for secondary reinforcement. *William K. Estes, Indiana University.*

PROBLEM: A previous investigation by the writer yielded evidence that an originally neutral stimulus which has been associated with the presentation of water to thirsty animals will subsequently exert a reinforcing effect upon responses elicited when the animals are hungry but not thirsty. The present experiment was designed to verify that finding and to determine whether the presence of a strong hunger drive on the test period is a necessary condition for the transfer of secondary reinforcing properties.

POPULATION: Twelve albino rats 110 days old.

PROCEDURE: A Skinner-type conditioning apparatus was used. First, all animals were pretested for rate of unconditioned bar-pressing under 24 hour water deprivation; all responses were recorded during a 30 minute period.

Next, the two experimental groups of four rats were deprived of water for 24 hours, then subjected to 55 presentations of small quantities of water accompanied by a characteristic auditory stimulus. Four control rats did not receive this training.

On the test period, motivating conditions were as follows. Control group and High-Drive group: 24 hours food deprivation, satiated on water. Low-Drive group: 6 hours food deprivation, satiated on water.

During the test session, bar-pressing responses produced the auditory stimulus previously associated with water reinforcement, but no other reinforcement.

RESULTS: Rate of responding increased significantly over the pretest rate for the high-drive group, but decreased for the other groups.

CONCLUSIONS: A secondary reinforcer is effective in the presence of some strong drive, but not necessarily the one under which the reinforcer was itself conditioned. (Slides).

10:30 AM The effect of partial reinforcement on the strength of secondary reinforcing cues. *David Ehrenfreund, State College of Washington.* (Abstract exceeded 300-word limit).

10:45 AM Maze learning in the absence of primary reinforcement: a study of the effective duration of secondary reinforcing properties. *Irving J. Saltzman, Johns Hopkins University.*

PROBLEM: Rats can learn a maze when the only reinforcement is secondary reinforcement previously established on a runway. The reinforcing power is rapidly lost, however. The problem here was to determine whether secondary reinforcement could be maintained by interpolating runway trials between the maze learning trials.

POPULATION: Two groups of 12 naive, hooded, female rats, 85 to 130 days old.

PROCEDURE: 1. *Establishment of secondary reinforcement.* Both groups of rats, previously maintained on a feeding schedule, were given five runs to food per day for five

days in a small grey runway. The goal box was white for half the animals in each group, and black for the other half. The animals had to jump up into the black goal box or down into the white goal box. 2. *Maze learning.* On the day after the last day of runway trials, 15 runs in a single-choice, non-correction, grey U-maze were given each of the rats. That color box in which a rat received food on the runway was placed on the nonpreferred side of the maze, and the other box, on the preferred side. The boxes were not visible from the choice point. None of the rats ever received food in the maze situation. The experimental group received a runway trial to food after each maze trial; the control group received only the 15 maze trials.

RESULTS: The experimental group made significantly more correct choices than the control group. The control animals show an initial rise and then a rapid drop in the number of correct choices. The experimental animals do not show the rapid drop.

CONCLUSIONS: Secondary reinforcement can be maintained by interpolating runway trials between the maze learning trials. The effect of the additional trials is to eliminate the rapid loss of the reinforcing properties. (Slides)

LEARNING III

11:10 AM, Thursday, Georgian Room

Volunteered papers selected by the division

ARTHUR W. MELTON, Chairman

11:10 AM The influence of training in "attention" on discrimination learning. *Douglas H. Lawrence, Yale University.*

PROBLEM: This experiment investigated the problem of whether or not previous training in "attending" to a cue influenced the nature of the association established between that cue and an instrumental response in a new learning situation.

POPULATION: Forty, male albino rats.

PROCEDURE: The animals were first trained to respond to one cue and ignore another in a successive discrimination. In this, black and white versus chain curtains (through which the animal had to run) and no-curtains were two cues that were combined by random pairing on successive trials. Half the animals learned to choose the right compartment on trials when the apparatus was all black and the left one when it was all white, irrespective of whether the curtains were present or absent. The other half of the animals learned to respond to the other cue. All animals were then trained on a simultaneous discrimination in which both cues were relevant, i.e. it could be learned on the basis of either one or both. They were then tested by (a) opposing the two cues, (b) removing one and retraining the animals, and (c) by removing

one cue, reversing the positive and negative aspects of the remaining cue, and then retraining the animals on this reversed discrimination.

RESULTS: It was found that the animals tended to choose the cue that they had been taught to attend to when the two cues were opposed; that retention and relearning were better on this cue; and that the animals could reverse the discrimination faster on this cue than on the one they had been taught to ignore.

CONCLUSIONS: The "natural dominance" of a cue can be modified by previous experience with that cue, and this in turn determines in part the influence that cue has on learning and performance in a discrimination situation.

11:25 AM Expectancy in the extinction of a conditioned operant response. *John P. Seward, University of California at Los Angeles.*

PROBLEM: Hull's inhibition theory of extinction implies that a learned response must be repeated without reinforcement to be extinguished. Tolman's sign-learning theory, that extinction occurs when reward is no longer expected, requires only that the consequences of a response be associated with non-reward, not that the response itself be made. An experiment was designed to test these predictions.

POPULATION: 35 albino rats, 4 to 5 months old, were divided into an experimental group of 18 and a control group of 17, with males and females equally apportioned. **PROCEDURE:** The response was to travel a 3-foot elevated path from a starting platform (S) to a goal platform (G). Training for all rats consisted of 10 trials to food. The following day group E rats were confined on G without food five 2-minute periods, while group C rats were similarly confined on a third platform (T). Next day all rats were extinguished to a criterion of 2 successive refusals to leave S in 3 minutes. For group E extinction trials were preceded and separated by 2 minutes on G; for group C they were preceded by 2 minutes on T and separated by 20 seconds on G and 100 seconds on T.

Mr. Nissim Levy collected the data.

RESULTS: The mean number of trials to extinction was: for group E, 5.1; for group C, 10.3. The difference was significant at the .01 level.

CONCLUSIONS: Since the two groups were treated alike except that group E spent more time on G without food, the results suggest that expectancy was one factor in extinction.

11:25 AM "Place" versus "response" learning in a human walking maze. *Stanford C. Ericksen, Vanderbilt University.*

PROBLEM: To test the applicability to human maze performance of principles set forth by Hull and Tolman to explain animal learning.

PROCEDURE: Twenty male college students were in each

of the Place and Response groups. The apparatus consisted of four treadles placed in the corners of a small room 6 x 7 feet. One pair of diagonally opposite treadles served as the goals—A and B, and the other pair the starting points, S₁ and S₂. The task for either group was to learn 12 correct choices between A and B, starting from S₁ or S₂. There were eight different predetermined arrangements of starting points. The correct sequence to be mastered by the Place group was: ABBAABABBABA. For the Response group, the correct series was in terms of right turns (R) and left turns (L) from either S₁ or S₂: RLLRRLRLRLR. With this arrangement the Place learners had to ignore the right-, left-turning cues while the Response group could learn only if they disregarded Place cues. The criterion was two successive errorless trials.

RESULTS: The data reveal no significant differences between the Place and Response groups in: (1) mean trials to learn, (2) mean errors to learn, (3) intra-group variability, and (4) rate of learning. Split-half reliabilities for both mazes ranged from .77 to .98 (using different S₁, S₂ sequences).

CONCLUSION: Place and Response theories (growing out of white rat studies) fail to provide a unique explanation for the results of this study which provided the same operational definitions of Place and Response learning as are used in the rat experiments. A preferred explanation is offered in terms of the functional use of ideational direction and control in the maze situation.

This experiment was performed in collaboration with Charles R. Porter.

11:40 AM The effect of differential training to single stimuli upon the acquisition of a size discrimination habit. *G. Robert Grice, University of Illinois.*

PROBLEM: An experiment has been reported by Lashley and Wade in which one group of rats made 200 jumps to a small circle in the jumping stand, and a second group made 200 jumps to a large one. Both groups then were trained to select the larger circle when the two were presented together. The group having made the responses to the small circle learned the problem with fewer errors than the group which had responded to the large. These results were interpreted by the authors as disproving the principle of stimulus generalization. It was desired to repeat this experiment with a larger number of subjects and in a situation not involving punishment and other complications of the jumping stand technique.

POPULATION: The subjects were 20 albino rats of Wistar strain.

PROCEDURE: In a specially designed visual discrimination apparatus, ten rats made 200 rewarded responses to a single white circle eight centimeters in diameter. Another group of ten rats made 200 rewarded responses to a five centimeter white circle. Both groups were then

trained in a discrimination problem in which the eight centimeter circle was positive and the five centimeter circle was negative.

RESULTS: The group with the preliminary training to the eight centimeter circle learned the discrimination problem at a significantly faster rate than the group with preliminary training to the five centimeter circle. This was opposed to the result of Lashley and Wade.

CONCLUSIONS: The data are interpreted as being in accord with the principle of generalization, and as confirming evidence for the continuity theory as opposed to the non-continuity interpretation of discrimination learning. The result further supports the view that size discrimination learning consists of the establishment of reaction tendencies to the specific stimuli rather than to a relationship between them. (Slides)

AUDITION

1:40 PM, Thursday, Georgian Room

Volunteered papers selected by the division

S. S. STEVENS, Chairman

1:40 PM Function of the auditory cortex: the localization of sound in space. *William D. Neff, University of Chicago and Mariano Yela, University of Madrid.*

PROBLEM: To investigate the role of the auditory cortex in the learning of a discriminatory response based upon the localization of sound in space.

SUBJECTS: Adult cats.

PROCEDURE: Step 1. Experimental animals were trained to choose one of three food boxes, the cue for the correct choice being a buzzer sounded in the appropriate position. Maximum times for correct delayed responses were also measured.

Step 2. The auditory cortex was ablated bilaterally in either one or two stages.

Step 3. Retention of the discriminatory response and delayed response established in Step 1 was measured. Retraining was given if necessary. Control tests involving visual discriminations were made.

RESULTS: 1. Unilateral ablation of the auditory cortex does not interfere with the retention of a learned response based upon spatial localization of sound.

2. Maximum times for correct delayed responses are decreased by unilateral ablation of the auditory cortex.

3. Bilateral ablation of the auditory cortex results in loss of the ability to make a learned response based upon spatial localization of sound.

The above results will be discussed in relation to earlier studies of the function of the auditory cortex.

1:55 PM The effects of interaural phase differences on the perception of pure tones. *W. R. Garner, Johns Hopkins University.*

PROBLEM: Most experiments on interaural phase differences have been aimed at understanding our ability to localize a sound source. These experiments were designed to determine what effects, apparent localization or otherwise, an interaural phase difference can produce on the perception of pure tones.

POPULATION: 54 Os of both sexes, ranged in age from 7 to 45 years.

PROCEDURE: The O, unaware of the nature of the experiment, was asked to listen to two tones heard in alternation, and to report whether the tones were the same or different, and later to state what the nature of the difference was. The alternating tones, heard in both ears, did not change except that the phase difference between the two ears was reversed, so that the ear which had been leading now lagged in phase, and vice versa. Judgments were obtained at 0, 30, 60, 90, 120, 150, and 180° phase difference, at two intensities, and at frequencies from 200 to 2000 cps.

RESULTS AND CONCLUSIONS: (1) All Os reported differences of some kind of apparent localization. 80% reported differences in pitch, an effect apparently related to diplacusis. 25% reported differences in loudness. Miscellaneous kinds of differences were also reported. (2) Fewer differences are reported as frequency is increased, with 50% still reporting some differences at 1200 cps. (3) Slightly more reports of differences were obtained at the higher intensity level. (4) The maximum number of reports, for any frequency, is received with phase differences of about 90°, with fewer reports as the phase difference approaches 0 or 180°. Although there is some shift in maximum sensitivity toward 180° with increasing frequency, this shift is too small to assume that the ear is responding to simple time differences.

ACKNOWLEDGMENT: The author is indebted to Mr. Michael Wertheimer for assistance in obtaining the experimental data. This research was conducted under contract with Special Devices Center.

2:10 PM The sharpness of tuning of the auditory mechanism. *J. C. R. Licklider, Harvard University.*

PROBLEM: The aim of the paper is to compare the inferences drawn from psychophysical experiments with the more direct results of physiological experiments on the question: how sharply selective is the auditory mechanism of frequency analysis? It has been argued, to be specific, that the function relating the spread of activity along the basilar membrane to the frequency of the stimulating tone can be derived from data on frequency discrimination and from data on masking. Further inferences about the distribution of activity in the cochlea have been drawn from experiments on beats, trills, pitch scales, auditory fatigue, hearing loss, and speech intelligibility. It is instructive to bring together these contributions to our 'conceptual neurophysiology' and to

examine them in the light of the findings of Békésy, who has measured the sharpness of tuning of various points along the basilar membrane by watching their vibrations through a microscope.

RESULTS: Most of the psychophysical evidence suggests that, if we start with high frequencies and work down the scale, the frequency selectivity of the cochlear mechanism increases (grows sharper) until we reach 1000 cps, then remains approximately constant down to 100 cps. Békésy's observations indicate, however, that the selectivity continues to improve with decreasing frequency all the way down to 100 cps. Galambos' data on the selectivity of single nerve fibers tend to corroborate Békésy's finding, as do the results of experiments on frequency localization in the cerebral cortex.

CONCLUSIONS: The discrepancy between the inferences from psychophysical data and the indications of physiological data suggest that the former are open to reinterpretation. A reinterpretation is proposed.

2:25 PM Effects of auditory fatigue on high-frequency pitch judgments. *W. R. Thurlow, University of Virginia.*

PROBLEM: To determine the effect of auditory fatigue upon subjective octave pitch and the difference limen, using high frequencies.

POPULATION: Judgments for each of 5 subjects.

PROCEDURE: *a.* Three experiments were carried out with each of 2 subjects on the effects of continued high intensity stimulation in one ear on the pitch and pitch difference limen in the other ear. Pitch was measured by subjective octave pitch above a 2000 cycle standard; difference limen was measured at 10,000 cycles (method of constant stimuli).

b. Experiments were conducted with 5 subjects on the effects of continued high intensity monaural stimulation (4000 cycles) on the octave pitch function, the difference limen at 10,500 cycles, and threshold of hearing at 4,000 and 10,500 cycles. Measurements were made for both ears.

RESULTS: When pitch shifted, it shifted in a downward direction. Shifts were negligible at the octave above the 2000 cycle standard, compared to shifts at the highest frequencies. The pitch shifts obtained were of the same order of magnitude for the two ears. However, the pitch shift in the ear opposite to the one stimulated was not necessarily accompanied by corresponding hearing threshold shifts. When difference limens changed, they increased, but shifts in pitch were not always accompanied by shifts in difference limen. Further experiments on day-to-day variation confirmed the lack of high relation between pitch and pitch difference limen.

CONCLUSIONS: Shifts of pitch at high frequencies following continued monaural stimulation are in a downward direction, of comparable magnitude in each ear; accom-

panying increases may occur in both ears in the difference limen. Octave-pitch and difference limen size at these frequencies are not highly related.

These measurements were gathered in cooperation with Mr. O. A. Trice. (Slides)

2:40 PM Loudness of speech in quiet and in noise. *Irwin Pollack, Harvard University.*

PROBLEMS: (1) To construct a scale of loudness for speech, and (2) to determine the effect of a background noise mask on the loudness of speech.

POPULATION: Two to twenty-four experienced listeners in various sections of the experimental program.

PROCEDURE: (1) For the construction of a scale of loudness for speech, the following procedures were employed: (a) monaural-binaural equal-loudness matches, (b) 'half-loudness' and 'twice-loudness' determinations, and (c) loudness-level measurements. (2) For the determination of the effect of a background masking noise on the loudness of speech, listeners matched in loudness the speech component of a speech signal immersed in noise to normal (noise-free) speech.

RESULTS AND CONCLUSIONS: (1) A loudness scale may be constructed for speech directly (without extrapolation from pure-tone data) on the basis of a weighted average of the results of procedures (a), (b), and (c). (2) On the basis of this loudness scale for speech (with the assumption that a masking noise effectively subtracts a constant number of loudness units), it is possible to predict fairly well the effect of a flat background noise on the loudness of speech.

SYMPOSIUM: COGNITIVE VERSUS STIMULUS-RESPONSE LEARNING

3:10 PM, Thursday, Georgian Room

NEAL E. MILLER, Chairman

Participants: Ernest R. Hilgard, David Krech, Kenneth W. Spence, Edward C. Tolman

VISION I

8:50 AM, Friday, Salle Moderne

Volunteered papers selected by the division

FRANK A. GELDARD, Chairman

8:50 AM The MacAdam color demonstrational apparatus. *Donald A. Gordon and Josef Cohen, University of Illinois.*

The optical system of the color demonstrational apparatus constructed at the Illinois Laboratory is discussed. The apparatus is based on a modern design by David L. MacAdam of the Eastman Kodak Company after those of Abney and Maxwell. The piece utilizes a ribbon filament lamp, a large replica grating, four plano-

convex lenses of varying focal lengths, and two wedge-type deviating prisms.

The following effects are discussed and demonstrated:

- (1) The projection of a large, highly saturated spectrum.
- (2) The mixture of the spectrum to produce white.
- (3) The production of a slit or circle of colored light.
- (4) The production of two slits of colored light and their mixture.
- (5) Overlapping circles in complementary colors to produce white. The complementaries may be changed continuously.
- (6) Overlapping circles of three primary colors to produce white. The primaries may be changed continuously.
- (7) A spectrophotometric curve superimposed on the projected spectrum and its integration to produce the color seen of the spectrophotometric curve.
- (8) The subtractive effect of filters.
- (9) Demonstration of colors having equal tristimulus values, but vastly different spectral compositions.
- (10) The break down of a Kodachrome slide to its components—a demonstration of the theory of three color printing.

9:05 AM Logic for the isolation of the primary color receptors by use of Prevost's colors. *Jozef Cohen and Donald A. Gordon, University of Illinois.*

Color vision, of all psychophysical phenomena, has perhaps the most elegant scientific formulation. The color manifold can be represented as a closed three dimensional space with reference to three arbitrary primaries. The selection of these primaries is arbitrary since any set will predict color mixture data as well as any other set. The eye has consistently failed to resolve the visual stimulus into its components, and the selection of the axes must therefore be made with reference to some outside criterion. Helmholtz selected his with color blindness as a basis, Hering to predict after images, Ladd Franklin on a phylogenetic basis.

There remains one possibility as yet unexplored. We refer to the subjective colors of Prevost (sometimes called the Fechnerian colors)—colors produced by the intermittent stimulation of the retina by black and white. Discovered by Prevost in 1826, there have been at least fifteen rediscoveries. The most common example is the Benham disk. The colors are produced by the differential rise and fall of the three receptors.

If this is true, then the color space need merely be explored. When colors are found which, when pulsed below the fusion frequency, do not give rise to any subjective colors, then only one receptor is being stimulated. If it be that the receptors of the eye are imaginary (as is probably the case), contour lines may be drawn in the color space and extrapolated out.

Apparatuses for exploring the color space are discussed—optical system with diffraction gratings and mirrors; tunable Polaroid filters; tunable interference filters.

A progress report of the experimental work at the Illinois Laboratory is given.

After the primaries are located by the technique described, appropriate rotations are made, and new chromaticity diagrams and fundamental sensation curves derived.

9:20 AM An attempt to construct a quantitative pseudo-isochromatic test of color vision. *A. Chapanis, Johns Hopkins University.*

PROBLEM: Pseudo-isochromatic plates for testing color vision have been used extensively because of their simplicity and great convenience. A major criticism of such tests, however, is that they do not measure the amount of color deficiency an individual has. This paper reports an attempt to construct and validate a quantitative test of color vision.

THE TEST: The test has six charts. Each contains a digit made up of colored dots varying in reflectance (Munsell values 3/, 4/, 5/, and 6/) on a field of gray dots of similar reflectances. The colors are constant in hue (Munsell 2.5BG) for all plates. They are also constant in saturation on any one plate, but three different saturations (Munsell chromas /2, /4, and /6) are used in different plates. The examinee is thus required to discriminate between gray and hues differing from gray, i.e., in saturation, by various amounts.

POPULATION: The subjects were 574 visitors to the Sesquicentennial Exhibition held in Baltimore during December 1947.

PROCEDURE: Subjects were tested individually in an enclosed booth. They were required to read the charts slowly and to report exactly what they saw. In addition to the test described above, the test battery contained 79 plates selected from four standard pseudo-isochromatic tests.

RESULTS: The split-half reliability of the new test, corrected by the Spearman-Brown formula, is $+0.964$. The correlation between scores on the new test and total scores on the other 79 plates is $+0.938$. If the latter can be used as an indication of the amount of color deficiency an individual has, the new test is reasonably valid. The new test, however, contains fewer steps than is desirable. CONCLUSIONS: Preliminary attempts to construct a quantitative test of color vision appear to have met with reasonable success.

ACKNOWLEDGMENT: This research was performed under Contract N5-ori-166, Task Order I, between the Special Devices Center, Office of Naval Research, and The Johns Hopkins University. (Slides)

9:35 AM Some variables influencing Vernier acuity. *Katherine E. Baker, Connecticut College for Women.* (Abstract exceeded 300-word limit)

VISION II

10:00 AM, Friday, Salle Moderne

Volunteered papers selected by the division

WILLIAM E. KAPPAUF, Chairman

10:00 AM Temporal discrimination of the eye at different positions of the retina. *Alex L. Sweet, Johns Hopkins University.*

PROBLEM: The purpose of this study was to measure, at different retinal positions, the sensitivity of the human eye in discriminating between stimuli that are separated in time.

POPULATION: Data were gathered on three observers, male undergraduates, of normal vision.

PROCEDURE: The procedure consisted of presenting two small flashes of light to the observer and having him report whether the two lights were coming on at the same time or at different times. The actual difference in time of onset between the two flashes was systematically controlled. From the judgments, threshold-values for perceiving a time difference could be computed.

The light-sources were two "flash-tubes" controlled electronically. These two lights were placed tangentially adjacent to each other on a horizontal perimeter. Judgments were obtained at the following retinal positions: fovea, and 5°, 10°, 20° and 40° in the nasal retina. Only the right eye was used. Readings were taken in a dark room, with the subjects dark-adapted.

The following were the physical characteristics of the stimuli: color, white; visual angle, 14 minutes; duration, 15 milliseconds; brightness, .25 foot-candles, and rate of presentation, once every two seconds.

The stimuli were presented according to the method of limits. The probable error of the "same" or equal-time judgments was computed as the threshold.

RESULTS AND CONCLUSIONS: A plot of the average thresholds against retinal position shows that from the minimum value at the fovea (where the threshold is about 5 milliseconds), there is a slight rise in threshold-value to 5° in the periphery, followed by a steep rise to 10°, with slightly larger thresholds at 20° and 40°.

This indicates, that the fovea, contrasted with the periphery, is most sensitive to time-differences. The decreased sensitivity of the periphery is clearly manifest, beginning with 10° in the periphery. (Slides)

10:15 AM The decrease of critical flicker frequency with age. *Henryk Misiak, Fordham University.*

PROBLEM: It has been demonstrated before that the critical flicker frequency (c.f.f.) in old people is significantly lower than in young. The purpose of this study was to investigate the form, extent and cause of the decrease in c.f.f. with age.

POPULATION: 182 males and 137 females free from any

visual pathology, ranging from 7 to 89 years of age, with a mean age of 36 years.

PROCEDURE: An electronic apparatus with a neon glow lamp giving an intermittent light whose rate could be controlled by 3 adjustable resistors was used. The circular test-patch was 5 mm. in diameter. From the distance of 12.8 in. the subtending visual angle was 48 min. The observations were made with the dominant eye. The c.f.f. value of each S was the mean of the readings obtained from flicker to fusion and from fusion to flicker, which numbered 20 on the average. In the early stage of the research Ss were tested for 10 days with the number of readings ranging as high as 80, but when no significant day to day changes were found and the correlation coefficient between readings obtained on successive days was found above .95, the number of readings was reduced.

RESULTS: The mean c.f.f. under the experimental conditions of the study was 41.18 c.p.s. for the males, 41.08 for the females. The mean c.f.f. for the youngest group was 42.91, for the oldest 36.04, the latter showing a 1.6 per cent drop. The correlation between age and c.f.f. was found to be -.52, etc. .56; the relation, however, was linear. No statistically significant changes in c.f.f. from one age-group to another were found, except between the young groups and individuals over 55. The inter-individual variability tends to increase, the intra-individual variability decrease, with age.

CONCLUSIONS: The c.f.f. decreases gradually with age; however it is only the individuals above 55 years of age who will tend to differ significantly from young individuals. The decrease seems to be due not to changes in the eye itself but to degenerative changes of the nervous system. (Slides)

10:30 AM Changes in visual perception of flicker, apparent motion and real motion after cerebral lesion. *Hans-Lukas Teuber and Morris B. Bender, New York University College of Medicine.*

Trauma of occipital lobes in man not only produces homonymous areas of blindness (scotomata) in the visual field, but characteristic alterations of perception in those homonymous areas of the field where vision is preserved. This study explores a particular aspect of these alterations in function, viz. the concomitant changes in perception of intermittent light (flicker) and of motion in the visual fields of brain injured subjects. In 28 Naval casualties with penetrating wounds of the occiput, critical frequencies for fusion of visual flicker (c.f.f.) were significantly below those of 20 normal controls in the center of the visual fields, and at additional points in each peripheral quadrant. In the defective fields, the per cent loss in c.f.f. (as compared with corresponding normal values), was minimal in a zone 10° from the fixation point. With increasing eccentricity the loss in

c.f.f. increased. Maxima in reduction of c.f.f. occurred in homonymous half fields or quadrants. In regions of greatest depression of c.f.f., there were also maximal disturbances in perception of apparent movement and of actual movement. The apparent speed of objects moving through areas of maximum depression in c.f.f. was increased. This was demonstrated when strips were moving at variable rates through different areas of the field and the subjects manipulated the relative speeds until they appeared subjectively equal. Thus, objects moving at various standard speeds appeared to subjects with trauma (but not to the controls) as either abnormally fast, or elongated, or multiplied. It was concluded: (1) neural rather than photochemical factors limit flicker perception in these brain injured subjects; (2) the limiting factor is an (abnormally slow) intermittence of cerebral function subserving vision; (3) one and the same functional mechanism determines perception of flicker, apparent motion, and actual motion after cerebral trauma.

10:45 AM Discrimination of simultaneity in a special case of the visual-auditory complication experiment.

J. W. Gebhard, Johns Hopkins University.

PROBLEM: To measure the threshold of simultaneity for a visual and an auditory stimulus.

POPULATION: Four trained observers.

PROCEDURE: Two black dots $\frac{1}{2}$ " in diameter were set one degree apart on a circular plastic sheet through which was viewed a rotating pointer six inches long and $\frac{3}{8}$ " thick. A synchronous motor and a gear box provided rates such that time values of five to 50 milliseconds per degree of rotation were obtained in 10 equal steps. A click heard in earphones was randomly synchronized with one or the other dot as the pointer passed it. The observer fixated the dots binocularly and determined which was coincident with the click at each pointer revolution. One hundred judgments were obtained at each of several settings above and below the rate of rotation at which 75% of the judgments was correct. All data were fitted by a method of least squares and thresholds were calculated. Investigation included the effect of direction of pointer movement and radial position of the dots relative to the center of rotation of the pointer. RESULTS: (1) Stable thresholds varying from 10 to 20 milliseconds depending upon the observer were obtained with dots separated by one degree. (2) Radial position of the dots was unimportant provided the angular separation was held constant. (3) Thresholds were not affected by the direction of passage of the pointer across the retina. (4) Individual differences in performance remained constant: observers responded little to training after a few trials.

CONCLUSIONS: The discrimination of simultaneity of a visual and an auditory stimulus is shown by this method

to fit the normal probability curve from $p = 50$ to $p = 100$. At threshold ($p = 75$), the small values obtained indicate that discrimination in the complication experiment can be improved by a method of exact fixation. (Research was carried out under Contract N5ori-166 for Special Devices Center). (Slides)

TRANSFER AND INTERFERENCE I

1:40 PM, Friday, Salle Moderne

Volunteered papers selected by the division

W. J. BROGDEN, Chairman

1:40 PM The retroactive inhibition of a conditioned response as a function of extinction during interpolated learning. *James Deese, Indiana University.*

PROBLEM: The effect of extinction of an original response during interpolated conditioning upon retroactive inhibition.

POPULATION: 16 laboratory dogs.

PROCEDURE: 4 groups of animals were used in a typical retroactive inhibition design. Shock was used as an UCS. Group I was conditioned to flex the right rear leg to a CS of 800 cycles in 6 series of 20 trials each. The left rear leg was then conditioned to a tone of the same frequency for 3 series. Finally reconditioning of the original response was made. Group II went through the same procedure, except that a CS of 528 cycles was used in interpolated learning. Group III was subjected to simple extinction of the original response during the three interpolated series. Group IV served as a retention control. Both responses could occur simultaneously. RESULTS: Extinction of the original response during interpolated learning occurred in groups I and II, but less than in group III, since the original response was maintained in strength to some degree by the reinforcement of the interpolated response which occurred simultaneously. Original learning during interpolated learning in group I remained in greater strength than in group II, the CS for interpolated learning being different in group II. Retroactive inhibition is directly related to the extinction of the original response during interpolated learning. Some important conditions of extinction (spontaneous recovery, etc.) are influenced by the presence of interpolated learning.

CONCLUSIONS: It is hypothesized that retroactive inhibition of a conditioned response depends upon the relative strengths of the responses at the time of relearning. It was demonstrated that the strength of the original response could be varied independently by extinction during interpolated learning and that this was related to the amount of RI.

1:55 PM The effect of differential extinction on spontaneous recovery. *Alvin M. Liberman, Wesleyan University.*

PROBLEM: Because the typical extinction procedure does not differentially reinforce the many responses which may occur, the animal is not required to differentiate the primarily extinguished response from other responses, and the extinctive tendency may therefore be expected to transfer broadly. The breadth of transfer of the extinctive tendency possibly determines the rate of spontaneous recovery, insofar as recovery may result from the incidental strengthening of the responses to which the extinction transferred. These assumptions imply that recovery should be reduced following an extinction procedure which narrows transfer by causing the animal to differentiate the to-be-extinguished response from a not-to-be-extinguished response.

POPULATION: 15 hooded rats and 6 albino rats (all males, three to five months old) in each of two experimental groups.

PROCEDURE: Two groups of rats were trained to a running-time criterion on each of two markedly different runways, A and B. Both groups were extinguished to a common running-time criterion on Runway A: one group (double-extinction) was given non-reinforced trials on A, interspersed with non-reinforced trials on B; the second group (differential extinction) received non-reinforced trials on A, interspersed with reinforced trials on B. All animals were tested for recovery on A (five trials) one hour after extinction.

RESULTS: Running-times during extinction indicate that the differential-extinction group achieved the greater differentiation of the runways. On each of the five recovery trials the differential-extinction group showed less recovery than the double-extinction group. (The differential-extinction group required the greater number of trials to extinguish, but the appropriate correlations show that this factor does not account for the lesser recovery.)

CONCLUSIONS: Spontaneous recovery of a running response in rats is reduced when the extinction procedure causes the animal to differentiate the primarily extinguished running response from a second running response.

2:10 PM Spontaneous recovery of verbal associations as a function of number of extinction periods. *Benton J. Underwood, Northwestern University.*

PROBLEM: Previous studies have shown that when two verbal responses are learned to the same stimulus, the first learned item tends to recover response strength with the passage of time. This phenomenon has been interpreted as being analogous to spontaneous recovery of conditioned responses. It is presumed that extinction of the first response takes place during the learning of the second. If the analogy is valid, it would be predicted that the greater the number of extinction periods (with

number of trials held constant), the less the spontaneous recovery of the first learned response. The present experiments test this prediction.

POPULATION: Forty-eight college students.

PROCEDURE: Materials were lists of 10 paired adjectives. The A-B list was always learned to one perfect recitation. The A-C list was always presented for 18 trials. In a series of three separate conditions, a block of 18 trials on the second (A-C) list was presented 1 min., 5 hr., and 24 hr. after original learning. In another series of three conditions the 18 trials on the A-C list were presented in two blocks of nine trials each, these coming 1 min. and 5 hr., 1 min. and 24 hr., and 5 hr. and 24 hr. after original learning. Twenty-four subjects served in each of the two series. In a final condition, all 48 subjects were presented the 18 trials in blocks of six trials each, a block being given 1 min., 5 hr., and 24 hr. after original learning. Counterbalancing of conditions was complete.

For all conditions, controlled association tests were given 48 hr. after original learning, followed by the relearning of the original (A-B) list.

RESULTS AND CONCLUSIONS: The prediction is confirmed by two measures: (1) the greater the number of extinction periods, the less the frequency of response from the first list on controlled association tests; (2) the greater the number of extinction periods the greater the number of trials required to relearn the original list. (Slides)

2:25 PM The relation between number of confirmations of one hypothesis and the speed of accepting a new and incompatible hypothesis. *R. P. Youls, Barnard College.*

PROBLEM: For human subjects working on arithmetic reasoning problems, to find the relationship between (a) the number of successful solutions by one hypothesis and, after that hypothesis fails, (b) the amount of time before a particular incompatible hypothesis is employed.

POPULATION AND MATERIALS: 80 Barnard College students, divided into 4 groups of 20 each. Fifty cards, each with a short arithmetic-reasoning problem; 40 of the problems solvable only when the subject uses hypothesis A; 10 of the problems solvable only when the subject uses hypothesis B.

PROCEDURE: Each subject solved a series of hypothesis-A problems followed by ten hypothesis-B problems. Log. time in seconds was recorded for the solution of each problem. The 4 groups of subjects received respectively 5, 10, 20, and 40 hypothesis-A problems before being given the 10 hypothesis-B problems.

RESULTS: 1. Time for hypothesis-A solutions smoothly and similarly decreased for all 4 groups. On the last solution by hypothesis A, the means of the groups differed significantly ($F = 11.00$, when $F_{.01} = 4.04$), with the 5-solution group taking the most time, the 10-

and 20-solution groups successively more, and the 40-solution group the least.

2. On the first hypothesis-B solution; the groups reversed their order of solution-time, with the 5-solution group taking the least time, the 10- and 20-solution groups successively more, and the 40-solution group the most ($F = 10.85$, when $F_{.01} = 4.04$).

3. Difference between times for last hypothesis-A solution and first hypothesis-B solution was significant at the .01 level for each group except the one with 5 hypothesis-A solutions.

CONCLUSIONS: 1. One determiner of resistance to a new hypothesis is number of previous successes on an incompatible hypothesis.

2. The results by this method seem reliable enough to indicate its further use in studies of acquisition and rejection of hypotheses in humans.

This study was done in collaboration with Miss Jean Kraus. (Slides)

TRANSFER AND INTERFERENCE II

2:50 PM, Friday, Salle Moderne

Volunteered papers selected by the division

JAMES J. GIBSON, Chairman

2:50 PM A dynamic theory of transfer. *George M. Haslerud, University of New Hampshire.*

PROBLEM: In contrast to the understanding of the nature and management of learning and retention is the confusion about the educationally vital problem of transfer and generalization. Almost the only general agreement is that transfer is small in amount; the various theories provide little basis for practical ways to increase transfer. BASIS OF PROPOSED THEORY: From analysis of the literature on transfer and from certain new experiments on rats by the author a dynamic concept of transfer emerges. In these experiments the patterning of free parts of a long unilinear maze according to the problem set in other parts is taken as evidence of transfer. THESIS: The very motivational factors which establish and maintain learning also act to keep transfer minimal; when the peculiar generalizing possibilities of these factors are exploited, transfer can be enlarged.

1. Organisms have innate capacity for easy generalization, probably proportional to the amount of effective cortex.

a. Simple transfer, e.g., equivalence, the gradient of sensory generalization, etc.

b. Relationships, principles, patterns, etc., transferable *par excellence* because not necessarily tied to any organ or situation.

2. The potential range of transfer and generalization becomes greatly reduced by the ordinary arrangement of learning situations.

a. Extinction of the similar, e.g., discrimination problem.
b. Limitation of the problem by the goal, e.g., goal orientation, finality of a goal, etc.

c. Interferences set up by subsequent goals.

3. Transfer can be increased.

a. Powerful *backward* generalizing properties of goal and subgoal gradients, e.g., regard any learning as set for only a subgoal and project the problem also to the head of the subsequent goal gradient for anticipation.

b. Moderate *forward* transfer in the post-subgoal gradient when interferences from end goal are reduced, e.g., delay of food at goal weakens end goal gradient. (Slides)

3:05 PM The similarity paradox in human learning: a resolution. *Charles E. Osgood, University of Connecticut.*

The classic statement of the relation between similarity and interference in learning is that "the greater the similarity, the greater the interference." Yet, the limiting case of maximal similarity for both stimuli and responses is in the successive repetition of any S-R association; neither stimuli nor responses are precisely identical from trial to trial, but they are maximally similar, and here the greatest facilitation (ordinary learning) is obtained. Previous attempts to resolve this paradox, such as those by Robinson and McGeoch, are shown to be inadequate. Analysis and classification of existing evidence in the fields of transfer and retroaction, utilizing those investigations where the locus of similarities is specifiable, yields three empirical laws: (a) when stimuli are varied and responses are functionally identical, facilitative transfer and retroaction effects are obtained, their magnitude increasing with the degree of stimulus similarity. (b) when responses are varied and stimuli are functionally identical, negative transfer and retroactive interference are obtained, their magnitude decreasing as the similarity among responses is increased. (c) when both stimulus and response members are simultaneously varied, negative transfer and retroactive interference are obtained, their magnitude increasing with the degree of stimulus similarity. When these empirical functions are integrated within a single framework, a three-dimensional surface is generated which simultaneously represents degrees of stimulus similarity, degrees of response similarity, and the direction and degree of either transfer or retroaction. This formulation (1) is consistent with all experimental data in the field, insofar as the writer's analysis of the literature has been adequate, (2) integrates the phenomena of both transfer and retroaction within a single framework, and (3) resolves the basic paradox—the fact of ordinary learning becomes theoretically feasible. (Slides)

3:20 PM The effects of differential degrees of similarity of stimulus-response relations on transfer of verbal learning. *Irene P. Robinson, University of Chicago.*

PROBLEM: To determine the effects on transfer of simultaneously varying the similarity of the stimulus and the response. (1) Does the degree of response similarity significantly affect amount of transfer, independent of different degrees of stimulus similarity? (2) Does the degree of stimulus similarity significantly affect amount of transfer, independent of response similarity? (3) Do variations in one experimental condition significantly modify the effects of the other, i.e., is there a significant interaction?

POPULATION: 63 university students, naive as to purpose of the experiment.

PROCEDURE: Learning material consisted of paired nonsense syllables, presented visually. The method of adjusted learning was used. Three degrees of similarity of stimulus and of response were employed, making possible a total of nine experimental conditions. All subjects first learned the same list of 8 paired associates. The second list learned was determined by the experimental condition to which the subject had been randomly assigned.

RESULTS: Analysis of variance was performed on the difference between number of errors in first and second learning tasks. Significant *F*'s occurred for response conditions and interaction, but not for stimulus conditions. The amount of transfer is an increasing function of response similarity, rate of increase being a positive function of stimulus similarity. The effect of the degree of stimulus similarity on amount of transfer is dependent on response conditions.

CONCLUSIONS: Laws of transfer formulated from traditional "single factor" experiments have placed undue emphasis upon stimulus similarity. Response similarity is an important determiner of transfer, independent of stimulus conditions. The effects of stimulus similarity can only be predicted if the response conditions are known. (Slides)

3:35 PM Transfer and retroactive inhibition as a function of the drive stimulus. *Delos D. Wickens and Lyne S. Reid, Ohio State University.*

PROBLEM: The purpose of this experiment is to test the following hypothesis: 1. The learning of a new response is slower when the drive stimulus is the same for both the old and new responses than when it is heterogeneous. 2. There is greater retroactive inhibition when the drive stimulus of the original and interpolated learning is similar. That is, do drive stimuli (hunger or thirst) have the same characteristics as external stimuli in the transfer and retroactive inhibition paradigms?

POPULATION: 32 female white rats of approximately 100 days old.

PROCEDURE: Following a period of adjustment to handling, and straightaway pretraining, sixteen animals were placed on food deprivation and sixteen on water deprivation. Both groups were then given eighteen trials on a T-maze, the goal box on the right arm of the maze containing the incentive appropriate to the drive.

The incentive was then shifted to the left arm, and the drive changed for half the animals of each group (hunger to thirst, or thirst to hunger). The drive for the remainder of the animals was unchanged. After all the animals had run to a criterion of ten correct responses in twelve trials on the left, the incentive was shifted back to the right arm, and the animals returned to their original drive state. They were then run to a similar criterion.

RESULTS: The hypotheses as originally stated were confirmed at a significant level of confidence.

CONCLUSIONS: This experiment extends the original Hull and Leeper studies in the discrimination of drive stimuli. First, it demonstrates that the drive stimulus easily becomes attached to a response, and second it places drive stimulus learning in the frame work of learning phenomenon heretofore usually limited to external stimuli.

REACTIVE INHIBITION

4:00 PM, Friday, Salle Moderne

Volunteered papers selected by the division

CLAUDE E. BUXTON, Chairman

4:00 PM A demonstration of learning based solely on the work inhibition drive—a substantiation of Hull's concept of S'R. *M. Ray Denny, Michigan State College.*

PROBLEM: The present study is an attempt to test the hypothesis that learning can take place on the basis of the work inhibition drive entirely independent of another motive, or set to learn or conscious intent to avoid work. **POPULATION:** The final procedure employed 38 elementary psychology students, 20 experimental and 18 control subjects.

PROCEDURE: The following procedure gave the most clear cut results. A drum exposure apparatus requiring adjustable amounts of work on the part of the subject to turn the drum was employed. *S* wore a glove and turned the handle against a pressure of approximately 10 pounds in order to present each new stimulus. The stimuli were 6 horizontal lines varying in length from 1½" to 2½" and 6 lines varying from 4½" to 5½" viewed individually through a 6 inch opening. All *S*'s were told the experiment was a study of the estimation of lengths of lines and the experimental group knew that part of the time the drum might turn automatically. Whenever *S* in the experimental group gave the verbal

response 5 or 2½, the drum turned automatically. For the control group the drum never turned automatically. All subjects were given 20 trials.

RESULTS: A steady progression from a mean of 4.7 "correct" responses on the first two trials (24 judgments) to a mean of 10.2 "correct" on the last two trials showed undeniable learning in the experimental group. Only 3 subjects were clearly conscious of the relationship between their response and work avoidance.

In the control group, there was no greater preference for the 5 and 2½ responses at the end than at the beginning of the experiment.

CONCLUSION: A response which is followed by the avoidance of work may be learned without the knowledge that any response is being learned and without the verbalized intent to avoid work. (Slides)

4:15 PM An investigation of the effects of massed practice of a motor skill. *R. B. Ammons, Tulane University.*

POPULATION: 200 undergraduate women college students, naive to rotary pursuit, served as Ss.

PROCEDURE: Ss practiced a total of 36 min. each on a Koerth-type pursuit rotor, the time being divided into 3 12-min. periods. These 12-min. periods were arranged as follows: an initial 12-min. period with a predetermined length of rest between the successive 20-sec. trials; a second 12-min. period of continuous practice, starting 25 min. after the end of the last trial in the initial period; a third 12-min. continuous practice period approximately 24 hrs. later. Ss were run in 7 groups, 6 of 28 Ss and one of 32. Conditions differed only as to the length of the constant rest period allowed between the 36 successive 20-sec. trials in the initial 12-min. practice period. These rests for the seven conditions were 0 sec., 20 sec., 50 sec., 2 min., 5 min., 12 min., or 24 hrs. in length. Groups were closely matched as to means and standard deviations for the first 20-sec. trial by reduction of 6 groups to 24 Ss and one to 20.

RESULTS: Means by 20-sec. trials were plotted for all groups, and an analysis made of the effects of initial distribution of practice on warming-up, temporary work decrement, and permanent work decrement. Temporary work decrement summates to a level which is a positively accelerated decreasing function of the length of inter-trial rest; and is subsequently greater during massed practice, the greater the initial distribution. Warming-up decrement disappears in subsequent sessions when initial intertrial rests are 2 min. or longer, while massing produces a relatively permanent decrement of as much as 30 per cent in performance level.

CONCLUSIONS: Massing of practice has a marked immediate and delayed effect on subsequent warming-up, and temporary and permanent work decrements.

4:30 PM Habit, performance and the detrimental effects of practice in motor learning. *Gregory A. Kimble, Brown University.*

PROBLEM: A primary assumption behind experimentation in motor learning is that it is performance rather than habit which is influenced by the characteristic detrimental effects of massed practice in the acquisition of skill. According to this postulate, skill is acquired at approximately the same rate regardless of the practice conditions, but performance is reduced to the extent that inhibitory processes accumulate as a result of decreasing the rest time between trials. A test of this major assumption is the purpose of the present experiment. **POPULATION:** Six groups of subjects were used in a pursuit rotor experiment. Two of these were control groups; four were experimental groups. Individually, the two control groups were a massed practice group and a spaced practice group. The experimental groups shifted in the course of practice from the massed to the distributed condition or vice versa. At least 10 subjects were used in each group.

PROCEDURE: The experimental design involved 20 practice trials, 50 sec. in length for all groups. The massed practice control group learned under conditions allowing 10 sec. rest between trials; the spaced practice condition allowed 70 sec. between trials. Two of the experimental groups shifted from massed practice to distributed practice after 5 and 9 learning trials. The other two experimental groups shifted from distributed to massed practice conditions at similar points in learning. **RESULTS:** Performance curves show that the shift in practice conditions produces a gradual change in performance to a level which is predictable from the control groups' learning curves.

CONCLUSIONS: The results confirm the hypothesis that it is performance that is controlled by the practice conditions.

The author wishes to acknowledge the assistance of Miss Marcia Hughes who collected the data.

4:45 PM The influence of the remote association gradient in determining the relative difficulty of items in serial rote learning. *B. R. Bugelski, University of Buffalo.*

POPULATION: 128 college students, experienced in nonsense syllable learning.

PROCEDURE: Each subject learned a serial list of eight nonsense syllables for eight trials by the anticipation method. A three-second exposure memory drum was used. Subjects spelled out responses which were recorded verbatim. They were encouraged to respond freely, even though in error, to each stimulus syllable. Responses were tabulated for each stimulus according to their locations in the list.

RESULTS: 1. Remote forward associations diminished

with negative acceleration from the first through the 6th degree of remoteness in accordance with Hull's theoretical analysis and his description of the stimulus trace. This confirmation contradicts a previous study purporting to deny the gradient. 2. First order remote associations were more frequent for stimuli appearing later in the list than for earlier stimuli. This finding suggests that the number of remote associations spanning a direct association, as originally proposed by Hull, is not enough to account for the relative difficulty of the separate items. The remote associations must be weighted in accordance with their values. A system of such values is suggested which alters Hull's symmetrical curve (showing greatest difficulty in the middle of a list) to one showing the greatest difficulty just beyond the middle, corresponding to the usual empirical finding. 3. Plotting of actual remote associations spanning the several direct associations results in a curve corresponding more closely to the newly derived one than to Hull's original deduction.

CONCLUSIONS: The results support Hull's deduction of the relative difficulty of learning items in a serial list and the concept of the diminishing strength of a stimulus trace. By assuming additional properties of such a trace, the greater difficulty of learning just beyond the middle of a list is explained. (Slides)

PERFORMANCE

8:50 AM, Saturday, Ballroom

Volunteered papers selected by the division

WILLIAM A. HUNT, Chairman

8:50 AM Factorial analysis of arm-hand precision tests. *Frank J. Dudek and Robert H. Seashore, Northwestern University.*

PROBLEM: To determine the nature of factors underlying performance on seven measures of visuo-motor coordination emphasizing precision of movement of preferred arm and hand.

POPULATION: 39 university men in Group I (completed); 100 men in Group II (data collected).

PROCEDURE: Administration of seven electrically scored motor tests under the cycle plan—cycles 1 and 2 on first day; cycles 3 and 4 48 hours later. Tests were: (1) Arm-hand sway, (2) arm-hand stationary aiming, (3) arm-hand stylus thrusting, (4) straight path stylus tracing, (5) irregular path stylus tracing, (6) two-dimensional rod-and-ring tracing, (7) three-dimensional rod-and-ring tracing.

RESULTS: Intra-day reliabilities (Cycles 3 vs. 4) ranged from .66 to .97; inter-day reliabilities (Cycles 2 vs. 4) ranged from .44 to .71. Using Thurstone's centroid method, three independent factors were extracted and tentatively identified as: involuntary arm and hand

movements; manipulating a stylus in two dimensions; and precision in manipulating a ring in three dimensions (including wrist rotation). Procedures for Group II were revised slightly to increase test reliabilities and data will be analyzed as for Group I.

CONCLUSIONS: Previous findings of Seashore and Adams, and of Humphreys, Buxton and Taylor which indicated at least one significant cluster of steadiness test scores among five tests are here extended to include five other tests which appear to involve two additional clusters or group factors. The project is continuing to determine whether there are still other factors involved in tests emphasizing body balance under both static and dynamic conditions.

The experiment is part of a larger project under the sponsorship of the Office of Naval Research. Experimenters were: Wayne Holtzman, Robert Houston, Douglas Ellis, William Knowles, and Richard Hetke.

9:05 AM The effect of speed-up instructions upon the performance of discrete movements in the horizontal plane. *Judson S. Brown, State University of Iowa.*

PROBLEM: To determine the effects of an increase in motivation upon the speed and accuracy with which human subjects can execute simple discrete movements of the hand and arm.

POPULATION: Twenty-four male undergraduate college students.

PROCEDURE: The task was that of sliding a light-weight pointer across a horizontal surface from one visually perceived line to another. Each movement was initiated at the sound of a buzzer and was confined to a horizontal line lying in the frontal plane. Three lengths of movement (2.5, 10, and 40 cm.) and two directions (left to right and right to left) were studied. Two groups of subjects were given the same instructions at the start of the test, but one group was, in addition, reminded repeatedly throughout the test that speed was important. Graphic records were obtained of the 60 reactions of each subject.

RESULTS AND CONCLUSIONS: (1) For both groups the mean movement-reaction time was 0.25 sec., being nearly independent of length or direction of movement. (2) The speed-up instructions produced only a slight decrease in total movement time at the two longer distances and an increase at the shortest. (3) Under both conditions, the more rapid the initial phase of the movement, the larger the constant errors, and the longer the time expended in making the final secondary corrective adjustments. (4) Both average and maximum speed of movement increased markedly with speed-up instructions, the obtained increases being almost exactly proportional at all three distances for both measures. The function relating speed of movement to distance

appears to be of the general form $y = ax^b$ for both groups.
(5) It is concluded that overall efficiency is altered but slightly by increased motivation since increases in speed are offset by losses in accuracy. (Slides)

9:20 AM A test of the effects of glutamic acid on the learning ability of the rat. *Eliot Stellar, Johns Hopkins.*

PROBLEM: Zimmerman and Ross reported that feeding excess glutamic acid to rats of the Sherman strain facilitated their maze learning ability. Of subsequent experiments on albino rats, one has suggested confirmation of these findings and two have reported no facilitating effects of glutamic acid on learning or reasoning. The present experiments were designed to help resolve these conflicting findings by duplicating, as nearly as possible, the study of Zimmerman and Ross, except for the strain of animals used.

POPULATION: Twenty-eight pigmented rats (descendants of the Lashley strain) were used.

PROCEDURE: The twenty-eight animals were divided into two equal groups matched for weight, sex, and litter. Starting at six weeks of age, the animals of one group were individually fed a supplement of 200 mgs. of neutralized 1 (+) glutamic acid with each daily meal of Chick Growena mash. The controls were maintained on the same feeding schedule but never received the glutamic acid supplement. After fourteen days of such treatment, the animals were allowed one trial a day on an eight-cul, single alternation, Warner-Warden maze for twenty-one days. The rats were then given eleven trials on an eight cul, double alternation, Warner-Warden maze and twenty-four trials on a four-cul, double alternation, elevated maze.

RESULTS: Statistical analysis showed no significant differences between the control and glutamic-fed rats in any of these tests in respect to the total time and error scores and the number of trials required to meet a criterion of four out of five errorless runs.

CONCLUSIONS: Strain differences remain as the only possible variable that could account for the difference in results between our experiment and that of Zimmerman and Ross. At present, there is little evidence for a facilitating effect of excess glutamic acid feeding on the learning ability of the rat.

William D. McElroy collaborated in the experiment. (Slides)

9:35 AM Experimentally induced changes in the mental performance of mental defectives. *Mrs. Kathryn Albert Gasorek, Florence Crittenden Home.*

In collaboration with Hoch, Parker and Waelch the mental performance of sixty mental defectives was measured under the influence of orally administered glutamic acid. Tests were administered prior to

medication and four and eight months after the beginning of medication. A follow-up at four months is planned. Part of the group was initially placed on glutamic acid and part on a placebo (Lactose). At the end of four months medication for some of the individuals was changed; those who initially received glutamic acid being given a placebo and those who initially were given a placebo were given glutamic acid.

Preliminary analysis of Binet scores indicates that with glutamic acid a small but significant rise in I. Q. occurs whereas those given a placebo do not show such change. Pattern analysis of the types of changes occurring on the Binet, as well as on other standardized psychological tests will be considered.

OTHER SENSES

10:00 AM, Saturday, Ballroom

Volunteered papers selected by the division

JOHN VOLKMAN, Chairman

10:00 AM The olfactorium, an apparatus for odor research. *Dean Foster, Joseph E. Seagram and Sons and Karl M. Dallenbach, Cornell University.*

The low reliability characteristic of much olfactory research has been due, in part, to an absence of fundamental controls. Most modern odor-research equipment permits relatively sensitive control of the pertinent physical and chemical variables. None, however, considers equally important qualities of the experimental situation. Although it is generally known that adaptation greatly affects subsequent responses, psychologists continue to conduct experiments in any convenient room or laboratory. The results obtained under such conditions are comparable to an auditory stimulus threshold obtained on a busy street corner.

Another weakness with traditional apparatus can be ascribed to the great sensitivity of the olfactory receptors.

The present paper describes the first instrument equipped to provide a completely controlled odor environment. Pure odor-free, or odor-bearing air, of known humidity, temperature, and pressure, may be automatically introduced into this instrument, the *Olfactorium*. It is essentially a glass double chamber of 250 cubic feet capacity, supplied with automatic air-purification and control apparatuses. Odorous materials can be introduced at different places and by different methods, or if desired, the air in either chamber can be left stagnant. The observer, after bathing, immediately enters the ante-chamber of the *Olfactorium*, dons an odorless envelope, and is then introduced into the observing compartment.

The instrument is flexible, and is adapted to a wide variety of quantitative and qualitative problems, some of which will be described. Data will also be presented

concerning the importance in olfactory research experiments of controlling frequently neglected variables, such as specific atmospheric conditions, residual odors of the subject, and conditions of stimulation.

We are indebted to E. H. Scofield for the idea of an olfactorium and aid in its design, and to the Seagram Company for providing the instrument and its installation.

10:15 AM Salt preference following denervation of the tongue. *Carl Pfaffmann and John K. Bare, Brown University.*

PROBLEM: Earlier experiments have shown that in a choice situation, normal rats will prefer a salt solution to water when both are available, provided that the solution lies above the preference threshold concentration. The amount of suprathreshold salt solution ingested is proportional to the strength of the solution up to a concentration of 0.9% (approx.) at which concentration the maximum preference is shown. Above this value, the preference falls off. Strong salt solutions are avoided. In the present study, this behavior was studied following surgical denervation of the tongue.

PROCEDURE: Bilateral removal of either one or both of the nerves supplying the anterior and posterior regions of the rat's tongue were carried out. The following groups were studied:

- Combined lingual (including chorda tympani) and glossopharyngeal (IXth) nerve removal (4 rats).
- Removal of IXth nerve only (4 rats).
- Removal of lingual (including chorda tympani) nerve only (5 rats).
- Control animals subjected to sham operations (3 rats).
- Normal unoperated animals (5 rats).

Following the appropriate surgical procedures and recovery therefrom, the salt preference over a wide range of salt concentrations was determined.

RESULTS: All groups showed the essential salt preference. On the other hand, animals with only the posterior tongue region innervated, showed an aversion to salt at slightly weaker salt concentrations than did normals. These results are considered to be preliminary until histological controls on the efficacy of the surgical procedures have been carried out.

CONCLUSIONS: The preference for salt solutions displayed by the normal rat is not exclusively dependent upon the nerves subserving lingual sensitivity. This suggests that some sensory mechanism other than lingual taste is essential in initiating this behavior. (Slides)

10:30 AM A psychological scale of weight and a formula for its derivation. *Robert S. Harper and S. S. Stevens, Harvard University.*

Previous work has indicated the possibility of constructing scales of psychological magnitudes. The present experiment was designed to illustrate the construction of a scale of subjective weight. Twelve observers selected the weight which felt "half as heavy" as the standard for each of eight series of weights. Each series consisted of a standard weight and six comparison weights. The criterion of "half as heavy" adopted by the observers was predominantly either (1) that weight which "pulls" half as much as the standard, or (2) that weight which when added to itself would be judged equal to the standard. From the data obtained a scale was constructed relating subjective weight (in vegs) to physical weight (in grams). The unit of subjective weight, called a veg, was designated as the weight experienced by lifting 100 gm.

When the veg scale is used to measure the subjective size of *jnds* for weight, it is found that they are not equal. *Jnds* increase rapidly in subjective size as physical weight is increased.

It has been customary to construct psychological scales by a kind of graphic integration of fractionation data. However, when the fractionation data give a simple function in a log-log plot, as they do in this case, it is possible to derive a formula relating the psychological and physical magnitudes. From the data such a formula was derived. The scales obtained from the graphical integration and from the mathematical formula agree.

10:45 AM Lack of randomness in sequences of auditory differential threshold data. *John P. Flynn, Naval Medical Research Institute.*

In psychophysics the psychometric function is assumed ordinarily to be a normal ogive, and this form is explained on the basis of the normal curve and the binomial expansion. A method of testing the validity of this explanation exists in the probability of arrangements and the theory of runs. This method has been applied to auditory differential threshold data. An analysis of 476 sequences, each one of 25 elements, obtained from four subjects shows that the probability of these sequences having arisen from a binomial universe to be less than .01. Two rhythms, a fast and a slow one, are indicated by the data, i.e., in some sequences there are too few runs and in others too many. (Slides)

PSYCHO GALVANIC REFLEX

11:10 AM, Saturday, Ballroom

Volunteered papers selected by the division

LORRIN RIGGS, Chairman

11:10 AM Individual differences in somatic response patterns. *John I. Lacey, Fels Research Institute.*

PROBLEM: To test the hypothesis of characteristic individual differences in somatic response *patterns*.

POPULATION: The main sample consisted of nine pregnant women tested at weekly intervals for nine weeks. A supplementary sample of seven college students tested three times a week for two weeks was also used.

PROCEDURE: Palmar conductance, blood pressures, heart-rate, and heart-rate variability were recorded during relaxation, anticipation of stress, reaction to stress, and recovery from stress. The stresses used were: rapid controlled association, difficult mental arithmetic, and the cold-pressor test. The serial measurements for each individual were then compared with those of every other individual, in an attempt to discern differential patterns of response.

RESULTS: Most subjects could be distinguished from at least one other subject, in that statistically significant reversals of the direction of discrimination between two subjects in a comparison occurred. That is: on the basis of the serial measurements one could say, e.g., that subject A showed significantly greater heart-rate reaction, and significantly less systolic blood pressure reaction than subject B.

CONCLUSIONS: The evidence supports the hypothesis that individuals may differ significantly in *patterns* of somatic response, and that the direction of discrimination between two individuals may depend upon the physiological variable used. (Slides)

11:25 AM Studies in the detection of deception: I. determination of guilt or innocence from psychogalvanic (PGR) records of delinquents and non-delinquents. *Fabian L. Rouke, City College of New York and Joseph F. Kubis, Fordham University.*

PROBLEM: to determine (1) under what conditions the PGR can be used as a valid index of deception. (2) whether delinquents are less subject to detection in a lie than non-delinquents.

POPULATION: Eighty (80) delinquent boys (Court referrals); ninety (90) non-delinquent controls.

PROCEDURE: Members of each group were divided into pairs and offered money by an assistant with instructions: that one of them should take it and keep it; when questioned concerning the money they were to deny possession; if they fooled the examiner they could keep the money; if detected they would be penalized.

Subjects were questioned orally, with two forms of a special questionnaire containing critical, emotional and buffer questions. During questioning a record of the PGR was taken with a two-stage D.C. amplifier and an Esterline-Angus recording milliammeter. A minimum of two records was obtained from each subject.

Judgments of guilt or innocence were made by the examiner at the end of each test session. Four months later the examiner and another judge (who had not taken

part in the experiment) independently made analyses of (a) isolated single records; (b) all the records of each subject; (c) the records of each pair.

RESULTS: (1) Analysis based on single records yielded low accuracy; based on two records accuracy was significantly above chance; based on the number of records deemed necessary by the examiner, accuracy reached 97%. (2) Comparative analysis of records of paired subjects was more accurate than individual analysis. (3) Analysis proved reliable after a four month interval. (4) Accuracy was not significantly greater for non-delinquents than for delinquents.

CONCLUSIONS: (1) When the number of records deemed necessary by an experienced examiner were obtained from each subject, the PGR proved a reliable and highly valid index of deception. (2) Although significantly above chance, analyses based on only two records are not sufficiently accurate for practical use. (3) Delinquents are not less subject to detection in a lie than non-delinquents.

11:40 AM On the application of analysis of variance to galvanic skin response data. *Harold E. Jones and Ernest A. Haggard, University of California, Berkeley.*

PROBLEM: To examine in detail four frequently used measures of the GSR in terms of the assumptions underlying the valid use of the analysis of variance and the *F*-test of significance (that is, that the data possess the qualities of: additivity, normality, homogeneity of the variances, and the independence of the means and variances). The importance of considering these assumptions, regardless of the type of data, lies in the fact that if they are sufficiently violated, the conclusions based on an *F*-test may be entirely misleading.

POPULATION: Fifty boys and 50 girls were tested at 13.5 and retested at 17.5 years of age. For the two samples together, a total of 2305 GSR's to 24 words previously rated by the S's as being pleasant, indifferent, and unpleasant in emotional tone were analyzed.

PROCEDURE: Each response was quantified in terms of the measures of: Resistance change, Conductance change, change in the Log Resistance, and Log of the change in Conductance. Separate analyses were made for each GSR measure, for the two age groups, and in some cases for the two sex groups in terms of the above mentioned assumptions underlying the analysis of variance. An additional test was made in terms of the precision of each of the four measures.

RESULTS AND CONCLUSIONS: From the findings of this study, the Log of the change in Conductance measure should be used to quantify GSR data because: (a) This measure most satisfactorily met the assumptions underlying the analysis of variance. (b) In addition, of the available measures which legitimately may be used to

quantify GSR data, the Log of the change in Conductance is most satisfactory in terms of its ease of computation, general utility, relation to the basic data, and theoretical generality. (Slides)

11:55 AM Adaptation of the psychogalvanic response (PGR) to a visual auditory and ideational stimulus.

J. F. Kubis, Fordham University.

PROBLEM: To determine (a) the existence of differences in the rate of specific and generalized adaptation of the PGR among three different types of stimuli; (b) the effect of zero, five and ten minute intervals between the applications of the different stimuli; and (c) the existence of sex differences.

POPULATION: Fifty-four male and eighteen female subjects between the ages of 17-26.

PROCEDURE: A Latin Square arrangement of subjects, stimuli and order of presentation was utilized in the experimental design, each subject being presented with three different stimuli: a light, a buzzer, and a question used as an ideational stimulus. Each stimulus was presented successively until the subject adapted to it. The criterion of adaptation was two successive failures of the stimulus to elicit a PGR reaction.

The duration of each stimulus was controlled by an electronic interval timer and the PGR response recorded by a two-stage D.C. amplifier with an ink recording millimeter.

Three intervals (zero, five and ten minutes) were used between presentations of the different stimuli after adaptation to one had been obtained. The eighteen girls were in the zero interval group for comparison with the male zero interval group ($N = 18$).

For this type of data a square root transformation was also considered and analyzed.

RESULTS AND CONCLUSIONS: (1) Significant differences were obtained among the adaptation rates to the three types of stimuli; the quickest to the light and the slowest to the ideational stimulus. (2) No significant general adaptation effects were noted although the trend of the data indicated a progressive diminution in adaptation scores from the first to the third position. (3) No significant effects were produced by varying the time intervals between applications of different stimuli. (4) There were no significant sex differences in adaptation. (5) Intercorrelations among stimuli were low, further evidence suggesting specificity of adaptation.

DIVISION ON EVALUATION AND MEASUREMENT

BUSINESS MEETING

4:30 PM, Wednesday, Parlor A

ANALYSIS OF TEST PROCEDURES

4:00 PM, Friday, Assembly Room

Volunteered papers selected by the division

HERBERT S. CONRAD, Chairman

4:00 PM The V. D. L. psychomotor scale for the measurement of manual ability. *M. J. A. Van Der Lugt, New York University.*

DESCRIPTION: This scale is an individual apparatus test consisting of a battery of ten original tests which have been designed to give in a relatively short time a comprehensive picture of a subject's manual ability, both in general and for specific factors.

After due consideration and experimentation, the choice of components has been limited to the following factors: speed, pressure, accuracy, motor memory, and static and dynamic coordination.

Each component is to be measured by two tests, one of which is primarily a motor and the other one primarily a sensory-motor test.

POPULATION: The original construction and standardization of this battery of tests was carried out in The Netherlands with 2,128 children from 6-12 years equally proportioned as to age, sex, and socio-economic groups.

An American standardization on children has been undertaken with no marked differences in the results.

RESULTS: Norms for children as well as for adults are worked out in percentile tables. The graph thus obtained shows for a given age group the relation between the subscores as well as the placement of the total score. An individual profile can be drawn from the percentile norms.

INTERPRETATION: The norms obtained on European children reveal:

- 1) a gradual development of the primary motor functions concerned with increase of age, at least until the age of twelve.
- 2) small differences in sex performances for several of the tests.
- 3) small, but distinctly marked differences between the socio-economic groups.
- 4) a negative correlation with intelligence for superior subjects; a strong positive correlation for feeble minded individuals; and no definite relationship for average subjects.

CONCLUSIONS: The battery is meant primarily for diagnostic purposes. Applications have been made in the educational, industrial, and clinical fields in various European countries and in limited application in the United States. More extensive research and use is needed.

4:15 PM The validity of "persistence" tests. *John W. French, Educational Testing Service.*

PROBLEM: As part of a large scale test development program, the College Entrance Examination Board now operating through the Educational Testing Service is trying out a number of types of tests not now included in its college entrance battery. The primary purpose in this program is to better the prediction of college success. One type of test being tried is designed to test persistence or related traits.

POPULATION: Applicants to Cooper Union Engineering School Class of 1950, U. S. Coast Guard Academy Class of 1949, and University of Washington Class of 1951.

PROCEDURE: Twelve different one-hour tests all measuring traits in this area have been administered to college populations, for whom college grades have been or will be obtained. Validity correlations and multiple correlations using academic tests and "persistence" tests have been computed.

RESULTS: Two out of the three "persistence" tests on which validity data have been obtained so far raise the multiple correlation between College Board academic tests and grades by .04 to .07 above its present level.

CONCLUSIONS: Present results warrant further studies. A final decision on the uses to which "persistence" tests can be put will await the results of the other tests which have been administered.

4:30 PM A factorial investigation of flexibility. *Robert W. Kleemeier and Frank J. Dudek, Northwestern University.*

PROBLEM: The purpose of this study was to investigate the nature of flexibility by factorial methods. For purposes of this study flexibility was defined as the ability to shift from one type of task to another.

POPULATION: Over 200 students served as subjects. These were volunteers from various classes in psychology.

PROCEDURE: A battery of 13 tests was constructed. These tests were designed to measure numerical, perceptual speed, and verbal factors. Within each area the attempt was to make some of the tests univocal (factorially pure). One test of each type, however, was designed to measure flexibility by requiring S to shift from one simple task to another. Thus, on these tests S was required to shift frequently from one perceptual task to another, from one number task to another, or from one type of verbal task to another. The tests were designed for machine-scoring, and were speed tests. Testing time to administer the entire battery was one and one-half hours.

RESULTS: The test scores will be intercorrelated and the matrix of intercorrelations will be factorially analyzed. The important considerations will be whether or not a factor called "flexibility" can be extracted in addition to the number, perceptual speed, and verbal factors that are obviously present. If, for example, those tests which re-

quire shifts of tasks appear on an independent axis (regardless of the type of ability represented) then this would be evidence for a factor which might be called "flexibility" and one which is common to different types of tasks.

4:45 PM An analytical study of reasoning among high-school boys. *Frederick B. Davis, George Peabody College for Teachers.*

PROBLEM: To discover some fundamental characteristics of human reasoning ability.

POPULATION: 789 eleventh- and twelfth-grade boys in New York City.

PROCEDURE: Fourteen short tests of various important aspects of reasoning ability were administered without time limit, the intercorrelations were calculated, and a factorial analysis was made.

RESULTS: Eleven factors that have variances greater than would be likely to occur by chance alone were obtained by analysis. Their nature suggests that reasoning ability is far from a unitary trait.

CONCLUSIONS: Four of the eleven uncorrelated factors that have variances greater than would usually be ascribed to chance were identified as reasoning abilities: Practical reasoning, deductive reasoning, syllogistic reasoning, and reasoning in reading. In evaluating an adult's reasoning ability, it appears that we should consider at least these four factors. A comparison with data on reasoning ability reported by Thurstone and by Guilford and Lacey has been made.

STATISTICAL AND SCALING TECHNIQUES

8:50 AM, Saturday, Parlor A

Volunteered papers selected by the division

E. LOWELL KELLY, Chairman

8:50 AM An investigation of the variation of the standard error of measurement. *William G. Mollenkopf, Princeton University.*

By making several assumptions about the moments of the scores on a pair of parallel tests, it was possible to derive a relationship between the standard error of measurement and the magnitude of the total score on a test in which items are scored +1 when correct and 0 when not correct. In the resulting equation were involved the standard deviation, the skewness, the kurtosis, and the matched-halves reliability of the scores on the test.

To test the adequacy of this equation, a large scale empirical study was carried out using a sample of 1,000 answer sheets on a test of 256 items. Nine synthetic tests were drawn from this test by means of item-analysis data. Each of three degrees of skewness (negative, zero, and positive) was combined with each of three degrees of kurtosis (platy-, meso-, and leptokurtosis) in planning

these tests. The actual magnitude of the standard error of measurement was found for each unit and for each five units of total test score on the synthetic test. The values predicted by the theoretical equation were compared with those empirically observed and also with those of the curve of best fit between total score and standard error of measurement.

For the test material used, in which guessing was an unimportant factor in success on an item, substantial agreement was found between the theoretical and the observed values. The zero-slope straight line resulting from the usual assumption that the standard error of measurement is constant was found to be an accurate representation of the observed standard error only when the score distribution was mesokurtic and had negligible skewness. Under these conditions, furthermore, the theoretical curve reduces to a zero-slope straight line. (Slides)

9:05 AM Effect of item difficulty and reliability on test score skewness. *Harold Gulliksen, Princeton University.*

PROBLEM: Can the third moment (m_3) of the test score distribution be determined from item parameters?

PROCEDURE: Test mean, variance, reliability and validity have been expressed as functions of a difficulty, reliability and validity index for each item. A similar expression for m_3 involves many terms of the form Σxyz (where x , y , and z stand for item scores). Appropriate approximations for these terms will be discussed.

RESULTS: For the case of chance relationships $m_3 = \Sigma p(1-p)(1-2p)$, which is a maximum when $p = .21+$, and a minimum when $p = .79-$.

For a test of items of the same difficulty perfectly correlated, the third moment is $K^2 m_3$ (K is number of items).

A general equation which will use some reasonable approximations to Σxyz will be presented and illustrated with data.

CONCLUSIONS: To maximize skewness use items with the highest item-test correlations. For negative skew, all these items should be answered correctly by 21+% of the group. For positive skew they should be answered correctly by 79-% of the group.

To obtain a distribution with zero skew

1. use all items of 50% difficulty, or
2. match each item of difficulty $50 + c$, and item-total correlation r_1 , with another item of difficulty $50 - c$, and item-total correlation r_1 .

Tests which have an item difficulty distribution which is perfectly symmetrical around the 50% point, will show a negative skew if the easy items correlate higher with total score than do the difficult items, and will show a positive skew if the difficult items correlate higher with total score than do the easy ones.

9:20 AM Quest for a random sample. *Edward L. Clark, Northwestern University.*

PROBLEM: To obtain empirical evidence for the usefulness of the standard error formula for the mean of a sample.

POPULATION: Five thousand leaves from a ginkgo tree and over 20,000 words from a dictionary measured for length; 75 sections of English students weighed, measured, and tested; 3500 students grouped according to month of birth whose high school rank, test scores, and college grades were noted; 2000 applicants for admission who were tested; and miscellaneous other groups such as sex groups for numerous entering freshman classes whose grades were considered.

PROCEDURE: For each of the populations mentioned above samples were selected quite as one might select a single sample for an investigation. The variability of sample means was compared with the variability of sample means which one might expect from a knowledge of the individual differences in the population.

RESULTS: In general the variability of the sample means was greater or even much greater than would be anticipated from a knowledge of individual differences. An exception to this general finding was the randomness of height and weight means of the 75 sections of English, and of the high school records, test scores, and grades of those students arranged according to month of birth.

CONCLUSIONS: The use of the standard error formula for many samples is of doubtful value in anticipating the means of successive samples. Frequently samples are not random samples of any identifiable population and so to consider them may lead to erroneous conclusions.

9:35 AM The measurement of citizenship activities and opinions in a national sample of college graduates. *C. Robert Pace, Syracuse University.*

MAJOR PROBLEM: to appraise the role in society (particularly in regard to citizenship) played by college educated men and women, relating this to the pattern of education received in college.

MINOR PROBLEM: to develop scales for measuring the amount and level of participation in citizenship activities; and scales for measuring the "desirability" of opinions with respect to politics, government, civic relations, and international affairs.

POPULATION: All living U. S. college graduates whose last names began with "Fa." Data were obtained by questionnaire from 63% of this group, and bias was checked by interviews with a sample of the non-respondents.

PROCEDURE: Two activity scales, similar to psychological scales, were prepared to measure participation in politics and civic affairs. Four opinion scales were prepared to indicate the extent to which alumni opinions correspond to the opinions of experts. These scales were included in the national survey of college graduates

conducted by the Research Department of Time Magazine. Scores were obtained on these scales and the results analyzed in relation to various educational, sociological, and psychological factors: for example, graduates of Liberal Arts colleges vs. Technical vs. Professional schools; large vs. small schools; men vs. women; marital status groups; age groups; occupational groups; regional groups.

RESULTS AND CONCLUSIONS: About one-fifth of college graduates engage in very few political or civic activities; another fifth are very active—writing letters, signing petitions, contributing money, etc. On 9 of the 24 opinion statements, the majority opinion of college graduates runs counter to the majority opinion of the experts. Patterns of participation and opinion are presented, together with technical notes on the methods of scale analysis and the test-retest consistency of the activity and opinion scales.

FACTORS IN ACHIEVEMENT

10:00 AM, Saturday, Parlor A

Volunteered papers selected by the division

C. ROBERT PACE, Chairman

10:00 AM The status of college students in terms of IQ's determined during childhood. *Royal B. Embree, Jr., University of Texas.*

PROBLEM: To discover the relationships between measures of mental ability determined during childhood and scores on college aptitude tests, entrance to and graduation from college, field of study and the completion of graduate or professional study.

POPULATION: Graduates of the University of Minnesota High School, 1921-1945, who attended college.

PROCEDURE: (1) *Follow-up.* The IQ's of approximately 1200 graduates were secured. 951 of these persons were traced to college. Data were available for 477 bachelor's degrees, 127 advanced degrees and 64 honor graduates. (2) *Equation.* Equations were established between IQ's and scores on the 1937 A. C. E. examination. The equation of these two measures provided a yardstick which could be applied to many situations. (3) *The IQ* used in this study was the mid-equated value of five IQ's determined from group intelligence tests. The distribution of mid-equated IQ's was closely similar to that of 1916 Stanford-Binet IQ's. Mid-equated IQ's correlated 0.60 with school marks, 0.82 with 1916 Stanford-Binet IQ's, 0.78 with 1937 Stanford-Binet IQ's and from 0.80 to 0.86 with scores on the A. C. E.

RESULTS: (1) Mean childhood IQ's of various groups were as follows: college entrants, 118; bachelor's degrees, 123; advanced degrees, 126; honors graduates, 133; and Phi Beta Kappa, 137. The IQ's of persons who received degrees ranged from 95 to 180. (2) Use of the equation produced many estimated mean IQ's, of which the fol-

lowing are especially significant: national college freshmen, 113; freshmen in highest and lowest colleges reporting to A. C. E. (1937), 133 and 100; teachers colleges, 109; 90th and 10th percentiles of national population of college freshmen, 133 and 100.

CONCLUSIONS: (1) That college populations are highly selected in terms of IQ's but that there is tremendous range in the IQ's of those who take bachelor's and advanced degrees in various areas of study. (2) That colleges in 1940 attracted a relatively large proportion of high deviates in IQ but only a fraction of those in the general population who were of generally superior mental ability as measured by IQ. (Slides)

10:15 AM The comparative achievement of veteran and non-veteran students in college. *William B. Schrader and Norman Frederiksen, Educational Testing Service, Princeton.*

This study was made possible by funds granted the Educational Testing Service by the Carnegie Corporation.

PROBLEM: To determine whether or not veteran students show higher college achievement, in relation to aptitude, than non-veteran students. Further plans include attempts (1) to relate differences in achievement to biographical data and attitudes reported in a questionnaire, and (2) to compare veterans who were enabled to go to college by the GI Bill and those not needing these benefits.

POPULATION: This report is based on 3,756 students in five colleges. (Eleven thousand students in sixteen colleges are included in the entire study.) These institutions were chosen to represent various geographical regions, private and public institutions, coeducational and men's colleges, and schools of liberal arts, engineering, and agriculture.

PROCEDURE: For analysis, the population was divided into six groups homogeneous with respect to institution, curriculum, and date of entrance. (Twenty-seven such groups are included in the entire study.) Veteran and non-veteran students were compared, using analysis of covariance techniques which provide significance tests for differences in errors of estimate, in slopes of regression lines, and in residual achievement after adjustment for differences in aptitude.

RESULTS: Results of the analysis for each of the six groups will be presented in terms of the probability that differences in errors of estimate, slopes, and residual achievement might have occurred by chance. The criterion was freshman average grade; the predictors included measures of high school success and entrance test scores.

CONCLUSIONS: Differences between male veterans and male non-veterans in residual achievement are consistently small. These differences are in favor of the veterans in the majority of the comparisons. (Slides)

10:30 AM Relationship of scores on West Point qualifying tests to later course grades. *Edmund F. Fuchs, Personnel Research Section, AGO.*

PROBLEM: To evaluate the effectiveness of a screening test in selecting from the applicants for admission to the West Point Military Academy those most likely to be successful in the academic course of study.

POPULATION: Three forms of the screening test were administered to three classes on admission to West Point. The total population involved is 2549. The number of cases involved in specific relationships varies from 84 in one class in a foreign language to 977 in one class in the common subjects of Mathematics and English.

PROCEDURE: Several alternate forms of a specially developed test, consisting of a subtest in artificial language usage in mathematical ingenuity, were administered entering classes at West Point Military Academy. Correlations between part and total tests scores were computed as predictors of course grades and over-all academic average.

RESULTS: 1. Scores on the total test predict grades in specific courses almost as well as the scores on the favored sub-test. 2. Correlation coefficients tend to become smaller for the more advanced college courses. 3. Correlation coefficients are highest for mathematics, next highest for English, and most variable for specific foreign languages.

10:45 AM Institutional standards as a factor in the validity of a scholastic aptitude test. *Herbert S. Conrad, Educational Testing Service, and Joseph M. Miller, Queens College.*

PROBLEM: To what extent does the validity of a college-aptitude test vary according to the type of institution in which it is employed?

POPULATION: 4300 first-term, male freshman students classified according to the institution attended, as follows: 941 attending 9 engineering schools; 1790 attending 17 universities; 199 attending 2 agricultural and mechanical colleges; 1145 attending 16 colleges; and 225 attending 4 teachers' colleges. A further sub-classification was made according to presence or absence of a chapter of Sigma Xi at the institution (24 institutions had such a chapter; 24 did not). All students took the same scholastic aptitude test, all were following the same nominal curriculum, all were assigned on average semester-grade on a 10-point scale, and all later took the same comprehensive achievement test.

PROCEDURE: For each of the 48 institutions separately, the correlation was computed between the scholastic aptitude test and the two criteria of average semester-grade and comprehensive achievement test score. Coefficients were then averaged for each class or sub-class of institution.

RESULTS: Substantially higher validity coefficients were found, on the average, in the engineering schools, uni-

versities, and agricultural and mechanical colleges than in the colleges or teachers colleges; and in the Sigma Xi institutions than in the non-Sigma Xi.

In general, the higher the average aptitude-test score of students in a given type of institution, the higher was the average validity coefficient.

CONCLUSIONS: The higher validity of the scholastic aptitude test in the type of institution with superior standards probably reflects the superior accuracy of grades in this type of institution. Other possible factors include: better academic motivation of students; superior curriculum; and superior teaching. Institutions with superior standards attract superior students, who in turn encourage the maintenance of superior standards.

ACKNOWLEDGMENT: This study is based on records from the Bureau of Naval Personnel.

11:00 AM Opinions of subordinate enlisted men as measures of supervisor job proficiency. *Stanley C. Markey, Personnel Research Section, AGO.*

PROBLEM: This study was made to determine: (a) The feasibility and methodological problems of obtaining in a military situation, enlisted men's opinions of their duty supervisors. (b) A usable technique for evaluating the opinions in terms of supervisors' job proficiency. (c) The reliability and validity of such a criterion measure.

POPULATION: Approximately 800 short essays by subordinates expressing their opinion of the work of their 375 supervisors were procured from food service personnel at eight Army installations. Subordinates ranged in grade from private to master sergeant; supervisors from sergeant to master sergeant.

PROCEDURE: A simple, single page form, Opinion Survey, was developed which listed seven guide questions for the subordinate in evaluating his supervisor. The subordinate was unidentified. No limit on time was set for completing the form although usually less than 20 minutes was required.

RESULTS: Subordinates' opinions were independently scaled by three research analysts into five rater defined classes reflecting the degree of supervisor proficiency expressed. Preliminary rater reliabilities for single installation samples vary from .78 to .89.

Factors affecting reliability such as length and number of opinions for each supervisor, grade of supervisor and subordinate were investigated. An indication of the validity of the opinion ratings will be presented by correlation with other criterion ratings by the supervisors' peers available for a part of the population, and with the results of an experimental efficiency report for enlisted men.

James H. Burke and Joel T. Campbell collaborated in the experiment.

11:15 AM The effect of supervisor's rank, specialty and sex upon the ratings of professional women. *Hyman Brandt, Personnel Research Section, AGO.*

PROBLEM: To investigate the effect of the supervisor's rank, specialty and sex (as well as the rater's own rank and specialty) upon performance ratings based on assignments of thirty days or longer.

POPULATION: More than 1500 women medical specialists have been screened for the Regular Army. One of the instruments, the Evaluation Report, was completed by three to six supervisors who had intimate knowledge of the applicant's performance. This instrument, assaying both professional competence and personal characteristics, combined the forced choice technique and special rating scales. In addition, scores on a Biographical Information Blank and on an Interview Blank were secured for each ratee.

PROCEDURE: Correlational techniques are being employed and analysis of variance and covariance will be made. The latter will disclose sources of variability and their respective significance with respect to the ratings:

(1) obtained from supervisors of varying rank, specialty and sex, (2) received by ratees of varying rank and specialty and (3) assigned to both the parts and the total Evaluation Report. These groupings will be used to ascertain the effect and the relationships between ER and BIB scores and interview ratings.

RESULTS: As a result of the analyses, answers to the following will be obtained:

- (1) Do supervisors of a given rank, specialty or sex, favor certain ranks or specialties of ratees?
- (2) Do certain supervisors use particular sections of all or certain rating scales exclusively?
- (3) Are certain ratees rated more highly on all or particular trait scales?

The collaboration of Kenneth R. Wood is gratefully acknowledged.

TEST VALIDITY AND RELIABILITY

11:40 AM, Saturday, Parlor A

Volunteered papers selected by the division

GEORGE K. BENNETT, Chairman

11:40 AM How valid is the Flesch readability formula?

Alberta S. Gilinsky, Tufts College.

PROBLEM: To test the validity of the Flesch readability formula against a scale of judged readability.

POPULATION: Fifteen literate college students.

PROCEDURE: Thurstone's "method of equal-appearing intervals" for attitude scale construction was used to establish a criterion of validity. Seventy-five samples of prose from various sources, including pulp fiction and technical treatises, were rated for reading ease. The median judged values were correlated with 'Flesch counts' (based on both original and revised formulas) on these samples. To avoid the objection that judgments do not dissociate difficulty of subject matter from difficulty of language, a second series of prose samples based on the same subject was written to order by various members of the laboratory. Each sample described, in

the writer's usual style, a number of specific facts about rod and cone vision. Readability ratings of these samples were again obtained as a validity criterion for the Flesch index. Further work now in progress aims to show the relation between electrically recorded eye movements during reading and the difficulty of the material read, as measured by Flesch scores on the one hand, and judged difficulty on the other hand.

RESULTS: Validity coefficients are reported and interpreted for both phases of the study. Correlations between readability judgments and Flesch counts range from .61 to .84.

CONCLUSIONS: The results suggest that the Flesch formula is a highly valid index of readability. A reading difficulty scale has been constructed which should prove useful not only for writers but for research on reading and remedial training.

11:55 AM The constancy of item-test correlation coefficients computed from upper and lower groups.

Jerome E. Doppelt and Edith M. Potts, Psychological Corporation.

PROBLEM: The paper deals with the results of an empirical investigation into the relative constancy of item-test coefficients of correlation computed by using only the upper 27% and lower 27% of the cases.

POPULATION: Three successive sub-samples of 370 cases each were selected from applicants for admission to schools of nursing. Each subject had taken a General Information test and the three sub-samples were similar with regard to mean and standard deviation on this test.

PROCEDURE: Item-test correlation coefficients were computed for each of the three sub-samples and for the total group by means of the upper and lower 27% method. The coefficients based on the combined group of over 1000 cases were used as the criterion for picking items with item-test coefficients within seven selected ranges. For these items, the standard deviations of the coefficients based on the sub-samples were computed and compared for the selected ranges.

RESULTS: The mean values for the seven groups of coefficients range from .27 to .58. There is practically no variation among the standard deviations of the groups; the smallest standard deviation is .06 and the largest is .08. If allowance is made for variance due to grouping, the standard deviations are somewhat lower.

CONCLUSIONS: The method for computing item-test coefficients by using upper and lower 27% seems entirely satisfactory when there are 100 cases in each of the upper and lower groups. With this number of cases the standard deviations of the coefficients compare favorably with the standard errors of product-moment and biserial coefficients.

12:10 PM Determination of optimal test reliability in a battery of aptitude tests. *John T. Dailey, Lackland Air Force Base, San Antonio, Texas.*

PROBLEM: In an aptitude battery of finite length composed of homogeneous tests, how reliable should each test be in order to maximize the composite validity of the battery?

POPULATION: Air Force Enlistees.

PROCEDURE: With tests composed of homogeneous items, test validity and reliability vary concomitantly with the number of items, and varying the length alters both reliability and validity. Shortening the test decreases both its validity and correlation with any other test by the same proportion. Thus the decreased validity is partially offset by decreased correlation with the remainder of the battery. The real criterion for determining optimal test reliability (and hence length) is the amount that each test contributes to the multiple validity. Items should be added to a given test only if their addition will increase the multiple validity more than would the addition of a similar number of items of a different type. Procedures are presented for determining when to cease adding items to each test in the battery.

RESULTS: It is demonstrated that as homogeneous items are added to a given test, the amount each successive item adds to the multiple validity falls off sharply. Thus the last items of a long test of highly valid items may add less than the first items of a much less valid type. Both theoretical and empirical results are presented to illustrate a method of approximating optimal test length and reliability.

CONCLUSIONS: While individual items should be as reliable as possible, it is very inefficient to utilize with reliabilities in excess of .60 if they are to be used only in weighted composites. Only rarely will types of items be

valid enough to justify including more than 15 or 20 in a given battery. Using tests of optimal reliability may substantially increase the multiple validity of a battery of fixed length.

12:25 PM Validation of some handwriting scales against personality inventory scores. *Maurice Lorr and Jacob V. Golder, Veterans Administration.*

PROBLEM: To validate a series of handwriting scales developed by Lewinson and Zubin against unitary personality traits based on factor analyzed self-inventories.

POPULATION: A group of approximately two hundred graduate student volunteers were used as subjects in this study.

PROCEDURE: The subjects were asked to write as a test of imagination a full page story on a standard sheet of unruled bond paper when presented with a Thematic Apperception Card. A specially prepared personality questionnaire consisting of selected items with the largest loadings on nine factors isolated by the Guilfords, Mosier, Reyburn and Taylor, and Thurstone was then administered. Samples of handwriting drawn from each sheet were analyzed and rated for fifteen variables by means of the Zubin Scales. The handwriting ratings were then intercorrelated with the inventory scores and the resulting correlational table was analyzed to identify the outstanding clusters of variables.

CONCLUSIONS: The significant intercorrelations of the handwriting and questionnaire variables will be presented and discussed in the light of previous studies. The meaningful clusters of variables identified will be described and interpreted.

DIVISION OF PHYSIOLOGICAL AND COMPARATIVE PSYCHOLOGY

All programs and symposia are sponsored jointly with the Division of Theoretical-Experimental Psychology.

See pages 235-256

DIVISION ON CHILDHOOD AND ADOLESCENCE

PRESIDENTIAL ADDRESS

1:40 PM, Tuesday, Parlor A

Florence L. Goodenough: Methods of Appraising Child Personality with Particular Reference to Projective Techniques

Business meeting: HAROLD H. ANDERSON, Chairman

BEHAVIOR IN EXPERIMENTAL PLAY SITUATIONS

8:50 AM, Wednesday, Salle Moderne

Volunteered papers selected by the division

WILLARD C. OLSON, Chairman

8:50 AM A comparison of the social behavior of deaf and non-deaf pre-school children in an experimental play situation. *Grace M. Heider, University of Kansas.*

PROBLEM: To investigate the ways in which the language limitations of young deaf children affect their social behavior.

POPULATION: 132 non-deaf children, ages 2:5-4:1, and 96 deaf children, ages 2:11-7:2, from four different memory school groups.

PROCEDURE: The experimental situation was a competitive one in which a ball was sent through a spiral trough in a screened box. The apparatus, which was designed so that it could be used by only one child at a

time, was presented to pairs of children for fifteen minute periods. Records were kept by quarter minutes of what went on between the members of each pair and the sequence of shots was tabulated.

RESULTS: 1. With the non-deaf there was a much greater tendency for one member of a pair to dominate a game; with the deaf the two members played more nearly on equal terms. This difference showed both in the descriptive records of behavior and in the distribution of shots.

2. When the games were classified according to degree of structurization it was found that 62% of those played by the non-deaf and only 25% of those played by the deaf children fell into the more highly structured types.

CONCLUSIONS: Differences between games of deaf and of non-deaf children could be explained partly by the more effective ways in which the non-deaf children used language to gain control of the situation without provoking the partner to attack or to withdraw. These differences indicate that the social environment of the deaf child is in many ways more diffuse and less sharply oriented than that of the non-deaf and raises questions as to the effect of this environmental situation on the development of personality.

9:05 AM Behavior of young children in play interviews as related to the extent and quality of self-regulation of their early schedules. *Amy R. Holway, and Esther B. Frankel, Merrill Palmer School.* (Abstract exceeded 300-word limit)

9:20 AM Measurement of dependency and aggression in doll play. *Pauline Snedden Sears, University of Iowa.*

PROBLEM: Development of a method by which succorant and nurturant forms of dependency and two types of aggression can be identified and measured in a standardized doll play situation with young children.

POPULATION: A preliminary group of thirty preschool children, and an experimental group of 45 children, approximately half of each sex, ranging in age from 3-5 to 5-2 years, white, the majority from middle class families. **PROCEDURE:** Categories relating to succorance and nurturance were derived from a theoretical analysis of the necessary consequences of parent-child relationships. These were revised by being applied to the doll play of a group of thirty children. The final set of categories had a satisfactory degree of observer reliability. They were then used to record the play of the experimental group during two experimental sessions, the duration of which varied for individual children but each of which provided approximately twenty minutes of non-tangential doll play.

RESULTS: Dependency responses were defined for these purposes as including: (1) succorance: help is solicited or a need is expressed with the implication that help is re-

quired; (2) nurturance: direct, personal help, protection or care is given another; (3) mutual affection: two or more dolls are made to show affection mutually; (4) mutual companionship: two or more dolls perform an activity with a companionship goal; (5) loving or approving statements are made about a doll.

Aggression responses were classified in two chief subgroupings: (1) stereotyped aggression: within normal limits, conventional; (2) nonstereotyped aggression: outside normal limits, fantastic.

The use of the method will be discussed in terms of the sex and age differences obtained in the various measures. Lois Jean Carl and Eleanor Hollenberg assisted in the experiment. (Slides)

9:35 AM A comparison of children's fantasies in two educated projective techniques. *John Elderkin Bell, Clark University.*

PROBLEM: The present study attempted to compare systematically the fantasies produced by young children on a verbal level in a picture story situation and on a motor level in an equated doll play situation. The purpose was two fold: to demonstrate a methodology for the comparison and the normative application of projective methods, and to evaluate a revision of a projective picture set proposed by Amen.

POPULATION: The subjects for both tests were thirty intellectually superior children, five, seven, and nine years of age, equally divided between the sexes.

RESULTS: The results were based on the comparison of the themes elicited, the affective values to the subjects of the stimulus areas presented, and the age and sex differences in responses in the two techniques.

1. More responses were given to the doll play situation, but a larger percentage of these were non-thematic.

2. Both techniques elicited a large percentage of responses which were concerned with the reenactment of social situations, but there were significant differences between the techniques in the incidence of various strongly affective themes.

3. Clinical psychologists succeeded in "blind matching" of the protocols from the two sets.

4. There was a positive correlation between psychologists' rankings on selected personality traits revealed by the protocols and teachers' rankings on these same traits based on behavior observations.

5. The group of seven year old children responded more emotionally than the five and nine year old groups. **CONCLUSIONS:** The picture story method evoked essentially the same personality pictures as those stimulated by the doll play technique, although the level of the fantasy brought out by the two methods differed. The projective methods were amenable to quantitative analysis and normative study. (The research was carried on cooperatively with Vera A. Simpkins, Clark University.) (Slides)

CHILDHOOD AND ADOLESCENCE

10:00 AM, Wednesday, Salle Moderne

Volunteered papers selected by the division

LEONARD CARMICHAEL, Chairman

10:00 AM Effects of cup, bottle and breast feeding on oral drive of newborn infants. *Robert R. Sears, University of Iowa.*

PROBLEM: To determine whether the amount of oral stimulation during feeding influences the strength of the sucking reflex and the frequency of spontaneous oral activities.

POPULATION: Sixty fullterm newborn white infants, born in the Department of Pediatrics, Kansas University Medical Center, Kansas City, Kansas.

PROCEDURE: Twenty babies were fed by breast, twenty by bottle, and twenty by cup during the first ten days of life. The duration of the sucking response to manual stimulation was measured twice daily. Three categories of spontaneous oral activity were observed by a time-sampling method four times daily, 100 seconds per time. Amount of crying was measured during three thirty minute periods daily. Appetite was judged on a three-point scale at three of the six daily feedings.

RESULTS: 1. Average duration of the sucking response, to test, did not change during the ten days in the bottle or cup fed groups, but increased steadily in the breast fed group.

2. The three groups did not differ in frequency of spontaneous oral activity, including thumb-sucking.

3. There were no significant differences between groups in amount of crying.

4. The breast fed group showed poorer appetite during the first three days than did the other two groups.

CONCLUSIONS: The data can be evaluated with reference to the question of how much the oral drive of infancy is influenced by experience. Breast feeding provides an ideal learning situation for the development of a secondary drive based on the sucking response (instrumental act) followed by primary drive reduction (hunger). The breast fed group's increase in strength of sucking response suggests that the oral drive is increased by breast feeding; a question must be raised as to whether the so-called oral component of the libido is not in part a result of feeding by a nearly universal method that requires the child to suck and be orally stimulated while securing primary gratification. (Slides)

10:15 AM Social change in the beliefs of adults concerning parent-child relationships. *Dale B. Harris, University of Minnesota.*

PROBLEM: To estimate attitude changes which had occurred in important areas of human relations within the last sixteen years—a period which has seen major changes in material and social culture.

POPULATION: Small groups of adults, selected to represent varying social backgrounds.

PROCEDURE: Certain of C. C. Peters' attitude scales relating to lovemaking, democratic attitudes and practices, and the treatment of children by parents as used in 1930, are being repeated, unchanged, with a variety of homogeneous social groups. The statistical analysis follows that used in the original study.

RESULTS AND CONCLUSIONS: In this paper only the results pertaining to relations of parents and children are reported. It is feasible, within certain broad limits, to study social changes in adult-child and other relationships through the medium of standardized attitude scales. Present day attitude toward children seem to be more liberal than those held fifteen or more years ago. There is a suggestion that present day social groups may be more homogeneous in attitude than social groups of the former period. As in the previous period, differences within groups outweigh differences between groups.

10:30 AM Physical maturing among boys as related to behavior. *Mary Coover Jones, Nancy Bayley and Harold E. Jones, University of California.*

This report from the Adolescent Growth Study deals with two groups of boys in the same school grade, who fall at opposite ends of a normal distribution on assessments of skeletal age.

The two groups showed the greatest contrast in physical characteristics between the ages of 13 and 15. During this period the early-maturing were tall, strong, well-muscled and "masculine" in build. The late maturing were small, slender, poorly-muscled and "childish" in build.

Psychological data include observational records, by staff members, of social behavior and personal attributes in same-sex and mixed group situations. In psychological characteristics the greatest differences between the two groups occurred at ages 15 and 16.

Skeletally accelerated boys are considered by adults and classmates to be more mature and more attractive in appearance. They are accorded more status but do not strive for it. From their ranks come outstanding student leaders. The skeletally retarded boys exhibit relatively immature behavior and react to their temporary physical disadvantage by greater activity, by striving for attention, or by withdrawing.

Case material is used to emphasize the complexities involved in developing adjustment patterns, and to indicate some factors, in addition to rate of maturing, which influence the behavior of individual boys in the extreme groups. (Slides)

10:45 AM An evaluation of investigations of the effective teacher. *Paul Wilty, Northwestern University.*

PROBLEM: To summarize and evaluate the results of studies of teacher efficiency in the elementary and the

secondary school. Various definitions of teaching efficiency will be compared. The results of statistical studies which have employed correlation techniques will be set forth. Qualitative studies which have utilized pupil evaluations will also be appraised. Finally, data from 35,000 letters written by pupils on the topic "The Teacher Who Has Helped Me Most" will be presented to reveal the characteristics admired and disliked in elementary and secondary school teachers. Different approaches to the study of teacher efficiency will then be evaluated, and an effort will be made to set forth the present status of the problem.

POPULATION: New data from 35,000 letters obtained in 1948 from pupils in grades I to XII.

PROCEDURE: Statistical analysis and comparison.

RESULTS: Study in progress, results available in September.

MENTAL DEVELOPMENT

11:10 AM, Wednesday, Salle Moderne

Volunteered papers selected by the division

ARNOLD GESELL, Chairman

11:10 AM Environmental influences on infant intelligence test scores. *A. R. Gilliland, Northwestern University.*

PROBLEM: To determine (1) differences in scores between infants reared in an institution and in private homes; (2) the effects of different types of homes; and (3) the types of test items on which differences occur.

POPULATION: Two hundred infants (more being added) of 6 to 12 weeks of age, half of whom have lived in an institution and the others in private homes.

PROCEDURE: The Northwestern Infant Intelligence Test, a new standardized test of 40 items with a split-half reliability of .87 and indications of a high validity was given to the above population. The placement institution accepts only healthy babies without serious hereditary defects. The average hereditary background is certainly as good as the lower half of the group from private homes.

The mean I.Q. of the institutional cases was 97.5 and for those from private homes was 109.5 (C.R. 3.—). Contrary to results with older children, economic status of the private homes had no effect on I.Q. On the other hand frequent and effective contacts with the social and physical environment did produce higher I.Q.'s. Infants with no better apparent hereditary background living in low income homes but with numerous contacts with a stimulating environment generally made above average scores.

A comparison of test items on which infants from private homes made higher scores than institutional infants showed that in 18 out of 40 a significant difference occurred. Half of these items dealt with adjustment to

the social and half to the physical environment. Tests of maturational changes showed no differences.

CONCLUSIONS: (1) Generally-normal babies reared in a good institution do not make as high scores on an intelligence test as do those reared in private homes. (2) A stimulating social and physical environment produces high scores on an intelligence test. (3) These differences show on certain test items and not on others.

11:25 AM Mental test performance of siblings. *Joan Kalthorn, Fels Research Institute, Antioch College.*

POPULATION: Thirty-nine pairs of siblings, first and second child respectively, subjects in the Fels Research Institute's longitudinal study of human development. The children, ranging in age from 30 months to twelve years, have been tested at regular intervals on alternate forms of the Stanford-Binet. Seventy per cent of these pairs in the present sample have had five or more tests administered at the same chronological age.

PROCEDURE: Records used were of tests administered to pairs of siblings at the same chronological age. Each child in the pair, therefore, had had an opportunity to pass or fail a specified set of items at the same age as his sibling. Item comparisons were made to determine whether, on a given item, there was a tendency for the older child to pass whereas his sibling, tested subsequently, failed, and vice versa. The difference in I.Q. between each child and his sibling was analyzed test by test for each age level.

RESULTS: Significant differences were found in the performance of siblings on a variety of Binet items. Older siblings tended to excel on rather abstract items; the younger child revealed superiority on a numerically greater number of items, and particularly on those involving realistic performance tasks. Younger children also tended to surpass their siblings on total I.Q.

CONCLUSIONS: First children in a family tend to perform intellectually in a manner different from the next younger child. The present findings do not justify definite statements as to the origin of these differences, but it might be supposed that an important factor is the intellectual stimulation and companionship received by the first child who is surrounded by adults, and that the relative neglect experienced by the second child, combined with a less protective policy, permits him greater freedom to explore and develop his own capacities. (Slides)

11:40 AM Some factors which influence performance of children on intelligence tests. *Ernest A. Haggard, Allison Davis, and Robert J. Havighurst, University of Chicago.*

PURPOSE: To investigate the effects of the following factors on children's performance on intelligence tests: (a) social status (upper-class, lower-class), (b) practice (motivated, unmotivated, absent), (c) motivation during retest (present, absent), (d) the form (traditional-type,

revised), and (e) manner of presentation (silent, oral) of the test.

POPULATION: 656 11- and 12-year-old children were tested. Half were upper-class, half lower-class. Each social status group was matched on age, school grade, and IQ.

PROCEDURE: Factorial design was used to study the effects of the variables and their interrelations. There were 28 separate groups, with from 17 to 39 children in each group. The Johnson-Neyman method of testing linear hypotheses was used to analyze the data. The experiment covered a five-day period, one hour per day: (a) Day 1, initial test, (b) Days 2-4, practice period, (c) Day 5, retest. On Day 5, two forms were given, one traditional-type and one revised to minimize "cultural bias." In addition, some children had the tests read to them. The tests contained 40 items.

RESULTS: Our findings include the following: (a) "Cultural bias" was removed successfully from some items, (b) Upper-class children gain more from practice on the traditional-type, but not on the revised items, (c) Lower-class children profited more from motivated retest when given the traditional-type form, (d) Both class groups profited from the revision, the lower-class children more, (e) Lower-class children profited more from oral presentation of the items, (f) With all factors considered, lower-class children showed more overall gain in performance from test to retest, indicating their ability to learn from experience, and (g) traditional-type items were more influenced by such factors as motivation and practice.

CONCLUSIONS: Traditional-type items contain sufficient "cultural bias" to penalize unduly children from lower-class backgrounds. Such items can be improved to be more nearly fair to all social status groups. (Slides)

11:55 AM Socio-economic status and performance on the A C E of Negro freshman college veterans and

non-veterans, from the North and South. S. O. Roberts, Fisk University.

PROBLEM: The purpose of this study was to investigate the performance on the A C E of comparable groups of Negro college males in terms of socio-economic status, veteran status, and regional origin.

POPULATION: The subjects were 253 college freshman, 1945-1947 inclusive. One hundred and forty-one (141) had served in World War II and 112 were entering college without war experience. Twenty per cent of the subjects were from the North and 80 per cent were from the South.

PROCEDURE: Parental occupations were classified according to the Minnesota Occupational Scale. All were given the A C E upon entrance. The scores were then cross-analyzed by socio-economic status, veteran status, and regional origin.

RESULTS: Subjects with fathers in the upper socio-economic levels, whether veteran or non-veteran, did better on the A C E than subjects with fathers in the lower levels. Non-veterans, even when matched with veterans for socio-economic status, had the higher score. The differences were greater and more significant between comparable groups from the North and South than for any of the differences within a given geographic region. Differences on the basis of the socio-economic ratings of mothers' occupations were less pronounced.

CONCLUSIONS: These data tend to support the findings of previous investigations using female subjects. This outcome suggests clearly that regional origin is a factor that carries with it a superiority of performance on an intelligence test for which neither socio-economic status nor the possible broadening influence of serving in the armed services can compensate. Furthermore, these results seem to be against the general environmental hypothesis frequently advanced to account for the observed differences in unmatched samples.

Hurley H. Doddy collaborated in the study.

DIVISION OF PERSONALITY AND SOCIAL PSYCHOLOGY

SOCIAL INTERACTION

8:50 AM, Wednesday, Parlor A

Volunteered papers selected by the division

EUGENE L. HARTLEY, Chairman

8:50 AM The development and evaluation of a measure of social interaction. Bernard Steinzor, Menninger Foundation.

PROBLEM: A reliable and valid instrument based on the intent of verbal behavior could be developed and would be useful in the study of the small group process.

POPULATION: Selected electrically recorded sessions of six small groups: a graduate seminar, a leaderless free-discussion group, a discussion section of a larger class, a

therapy group and two problem solving groups provided the material for categorization and evaluation.

PROCEDURE: The developed instrument contained fifty possible subcategories which were a combination of 18 intents and three loci or direction of intents. The intents were given the labels of activate, structure, diagnose, evaluate, analyse, give information, seek information, clarify, defend, offer solution, conciliate, understand, give support, seek support, oppose, defer, conform and entertain. Three loci of degrees of self involvement were labeled the self, the group and the issue locus.

RESULTS: a) Reliability: The Chi-Square test and per cent of agreement among various pairs of judges were the indices used to determine how accurately others would use the instrument. The average judge's codings agreed

fairly well with the investigator's, though significant inter-judge variability on sessions as a whole, as well as on single categories, was found.

b) Validity: The investigator's codings were used.

1) Patterns of intents and loci for each group were compared with those of other groups. Statistically significant distinctions were found. 2) Ratios of various sets of intents were found to distinguish the groups. 3) Changes in these ratios among intents over a series of sessions for two groups could be consistently related to other observations made of the groups. 4) The expression of certain intents stimulated or failed to stimulate others in a significant manner. 5) Patterns of intents of members could be related to sociometric and observational data.

CONCLUSIONS: 1) The instrument can be accurately used by others with sufficient training.

2) The dimensions of intent and locus of intent seem to be significant ones in the group process.

9:05 AM A generalized procedure for constructing indexes of social assimilation. *Warren G. Findley, The Air University.*

PROBLEM: To develop a general formula for measuring equality of acceptance of individuals within a group.

POPULATIONS: Small groups of Air Force officers, educators, high school students.

PROCEDURE: In a paper presented at the 1947 meetings, a formula was developed for indicating on a scale from 0 to 100 the evenness of participation in discussion. More recently, a similar formula was developed to express in a single index the extent to which all the individuals in a school class were well assimilated into the group. This was based on data in which each child expressed preference for 3 classmates in each of 4 activities and in each of 12 situations.

RESULTS: 1) Index of Group Assimilation

$$= 100 \left[1 - \frac{nN}{(N-1)(N-1-n)} \frac{\sigma^2}{M^2} \right] \text{ or}$$

$$= 100 \left[1 - \frac{N\sigma^2}{nc^2(N-1)(N-1-n)} \right]$$

where N = number of children.

n = number for whom preference is expressed on a given count.

c = number of counts on which preference is expressed.

σ = standard deviation of frequencies with which individuals were chosen.

2) Application of the index to seven classes in a public school and to other groups indicates a linear scale can be established. Systematic variation with age and grade is explored.

CONCLUSION: A general index of the type $100 \left(1 - k \frac{\sigma^2}{M^2} \right)^h$

may be adapted to measuring equality of acceptance of individuals in groups. In each case k is the reciprocal of the value that takes on when a maximum dispersion results from the most extreme unevenness of acceptance of individuals within the group. Different values may be assigned to h in different situations to produce a linear scale of values of the index. The Index of Participation and the Index of Group Assimilation are special cases of a general type of index of equality of acceptance.

9:20 AM An analysis of the effect of individuals on seminar discussion. *Thomas F. Staton, The Air University.*

PROBLEM: To estimate the potency of an individual in a group discussion through analysis of his contributions.

POPULATION: Five seminar groups of ten officers each were studied, reorganized, and re-studied. Group members were drawn at random from the 750 students in the Air Tactical School of Air University.

PROCEDURE: The present study utilizes techniques devised in pilot studies conducted in the Air War College in 1947, and involves observation and sound recordings of ten Air Tactical School seminars, each composed of ten officers and running for two and one-half hours. Typescripts of each session were made from sound recordings and observers' notes. From these typescripts each officer's "pattern of participation" was derived, through synthesis of his statements into categories formulated and systematized in the pilot studies. At the conclusion of each session, each officer's effectiveness was rated by each other officer. Relationships were determined between the "potency ratings" thus obtained and the pattern of participation. Evaluations of conclusions of each seminar were made by Air Tactical School staff members, and the relationship between potencies of individuals and quality of seminar results was ascertained. The 50 officers were then reorganized into five new seminar groups, and the attempt was made to predict individual and group potency through utilization of techniques and instruments derived through analysis of the five original groups.

RESULTS: 1. An individual's pattern of participation was found to provide a significant index of his effect on seminar discussion, using potency ratings as criteria.

2. Substantial homogeneity in experience, ability, and rank of members appears to make for good procedure and conclusions in a seminar.

CONCLUSIONS: 1. Potency of influence of individuals in a group discussion can be estimated by comparison of their discussion statements with member-approved patterns of participation.

2. One factor in optimum seminar conditions is that participants should be generally comparable in ability and prestige.

9:35 AM The real consequences of human actions as a

neglected factor in certain types of social behavior.

Alexander Mintz, *City College of New York.*

HYPOTHESIS: The disastrous consequences of panics are explained in terms of the nature of certain situations in which cooperative behavior is easily disorganized and, once disorganized, loses its rewards for individuals; then a competitive situation develops which may lead to disaster. Thus at a theater fire it pays people not to push if everybody cooperates. If an uncooperative minority blocks the exits any person who does not push is practically certain to be burned; thus pushing becomes the adaptive form of behavior. This explanation is proposed as a substitute for the usual one in which the characteristic inefficiency of behavior in many social situations is explained by the social facilitation of emotion and similar factors.

PROBLEM: To provide illustrative material for the above hypothesis by means of experiments in specially designed miniature social situations.

POPULATION: About 25 groups of college students, ca. 20 students in each group.

PROCEDURE: A number of cones are placed in a bottle. Each subject is to take out one cone. Only one cone can come out at a time. The situation can be represented to a group as a game in which individuals can win or lose, or as a measure of their ability to cooperate. Behavior suggestive of emotion can be made freely recognizable or can be hidden by appropriate screens.

RESULTS: In the large majority of cases, groups instructed to cooperate could get all cones out of the bottle rather quickly. When instructed to play a game, almost all groups created "traffic jams" preventing the taking out of any or most of the cones. Excited screaming in the group etc., had little effect on the results.

CONCLUSIONS: The experiments gave the expected results thus contributing to a validation of the hypothesis. The hypothesis appears to apply to other social phenomena in addition to panics.

INTERGROUP RELATIONS

10:00 AM, Wednesday, Parlor A

Volunteered papers selected by the division

MARIE JAHODA, Chairman

10:00 AM Tolerance toward ambiguity as a personality variable. *Else Frenkel-Brunswik, University of California.*

Gestalt psychology was accused of morbidity, by the Nazi psychologist Jaensch, for emphasizing the ambiguity of perception. Study of interviews with 100 adults extremely high or low on acceptance of directly expressed ethnic prejudice (Berkeley Public Opinion Study) and with 200 similarly selected 9 to 14 year old children (Institute of Child Welfare, University of California) further confirmed the writer in considering tolerance of ambiguity as a general personality variable relevant to

basic social orientation. However, it is the tolerant or judicious rather than the morbid person who shows greater readiness to accept diversities and ambiguities. Systematic ratings of the interviews with "liberal" adults and children show that their outlook cuts across national and racial demarcation lines and the barriers defined by sex-roles and dominance-submission patterns. The prejudiced are significantly more often given to dichotomous conceptions of the sex-roles, of the parent-child relationship, and of interpersonal relationships in general. They are less permissive and lean toward rigid categorization of cultural norms. Power—weakness, cleanliness—dirtiness, morality—immorality, conformance—divergence are the dimensions through which people are seen. The prejudiced also tend to show rigidity in their cognitive processes. There is sensitivity against qualified as contrasted with unqualified statements and against perceptual ambiguity; a disinclination to think in terms of probability and a favoring of black-and-white stereotypes; a comparative inability to abandon mental sets in intellectual tasks, such as in solving mathematical problems, after they have lost their appropriateness. Relations to home discipline and to the ensuing attitude toward authority will likewise be demonstrated quantitatively.

10:15 AM The movie story game: a projective test of interracial attitudes for use with negro and white children. *Isidor Chein, Commission on Community Interrelations, and Mary C. Evans, New School for Social Research.*

The Movie Story Game was designed to measure two aspects of attitude of Negro and white children: preference for segregated situations and stereotyped thinking. The children are told that material is being collected for children's movies, books and stories.

The materials used are two "movie sets": a playground set and a living room set; and twenty-two miniature standing figures: ten white boy and girl figures, ten dark-colored boy and girl figures to represent Negro children, and a white and dark-colored mother figure. The children are asked to provide action and dialogue for 28 standardized story situations through the "main character", a figure of like sex and color as the interviewee. The story situations require the main character to select for games and parties figures identified variously as friends or strangers; to explain the good and bad behavior of members of the other ethnic group; and to respond verbally and behaviorally to the prejudiced behavior of a member of his own group.

At the completion of this projective interview, the interviewee is asked in which of ten other situations he would include or exclude the other ethnic group and to what extent he himself has had contact with members of the other ethnic group.

Test data on the original form of the test will be pre-

sented for 101 Negro and white children, eight to fourteen years of age, and on a revised form for fifty white children, seven to ten years of age.

General features of administrative and scoring procedures and problems of interpretation will be reported. (Slides).

10:30 AM Customer reactions to the integration of negro sales personnel. *Gerhart Saenger, New York University.*

PROBLEM: As the result of recent legislation New York department stores began hiring Negro sales clerks. A study was made to ascertain (1) to what extent this would lead to customer resistance, (2) whether pre-judicial attitudes, disapproval, would lead to discriminatory behavior.

PROCEDURE: A random sample of 256 customers was observed without their knowledge while dealing with Negro or adjacent white sales clerks in the stores, and interviewed an hour later concerning their general attitudes, approval of Negro employment on different skill levels, awareness of and reactions to Negro clerks.

RESULTS: Although more than half of the population showed varying degrees of prejudice and a smaller proportion explicitly disapproved of Negro clerks, there was no correlation between prejudice or disapproval and buying behavior, e.g., leaving the store or turning to a white sales clerk. Failure to translate prejudicial attitudes into action resulted from (1) ambivalent feelings about discrimination, (2) a conflict between the desire to act out one's prejudice and the desire to buy cheap and conveniently, (3) the tendency to accept social innovations apparently sanctioned by the population and introduced without previous announcement (*fait accompli*). Prejudicial attitudes also affected perception. Persons opposed to Negro sales personnel exposed to colored clerks failed to perceive their color or failed to recall having seen Negro clerks, and were thus prevented from realizing inconsistencies between attitudes and behavior. Finally there was evidence that exposure to Negro clerks tended to reduce prejudice.

CONCLUSION: In the situation described prejudicial attitudes do not lead to expected discriminatory behavior. Opinion and attitude surveys prior to their initiation would thus have failed to predict public reaction to Negro employment as sales clerks.

Emily Gilbert collaborated in the observations of this study.

10:45 AM An experiment in training volunteer trainers. *John Harding, Commission on Community Interrelations.*

Previous research has shown that skilled group workers can train lay people to answer public anti-minority remarks in a reasonably effective fashion. The two problems with which this paper will deal are: (1) Can similar

results be achieved by volunteer trainers who have not had such professional preparation? and (2) What procedures are needed to train the volunteer trainers for their work?

Subjects for the experiment were ten volunteer trainers, each representing a group of people who wanted to be trained in methods of answering anti-minority remarks. The groups varied in size from four to twenty members. Two were church groups, two were student groups, one was a veterans' group, and five were women's groups.

The volunteer trainers attended a 16 hour training institute spread over a period of five weeks. They proceeded to give their groups a seven hour training course modeled on the course developed and used by the group workers in our previous experiment.

Three types of measurement were made in the training institute and in each of the training courses: (1) Observations recorded during the training sessions by observers selected and trained for this purpose, (2) reports made at the end of the training period by trainers and trainees, (3) reactions of trainees in "test incidents" which were arranged at the beginning and at the end of the training courses to give them an opportunity to demonstrate the extent of their ability to answer anti-minority remarks.

These criteria will be used to compare the effectiveness of the volunteer trainers with each other and with the group workers in our previous experiment. The findings will be discussed with reference to the general problem of the development and communication of social skills.

PRESIDENTIAL ADDRESS

8:50 AM, Thursday, Assembly Room

Gardner Murphy: The Planning of Research in Social Psychology and Personality Study
Business meeting following

LEADERSHIP

11:10 AM, Thursday, Assembly Room

Volunteered papers selected by the division

DORWIN CARTWRIGHT, Chairman

11:10 AM The dependence of the effect of the group on the individual upon the character of the leadership.
Roy K. Heintz and Malcolm G. Preston, University of Pennsylvania.

PROBLEM: 1. To ascertain the relative efficiencies of 2 leadership techniques as factors in shifting preferences. 2. To devise a procedure for the study of leadership suitable for use in laboratory courses.

POPULATION: 83 college students, male and female, enrolled in lab sections, Psychology of Education courses. 160 non-college adults, largely employees of United Parcel Co.

PROCEDURE: 1. All subjects ranked 12 potential presidential candidates in order of personal preference.

2. Subjects were divided into groups of 4 or 5. Each elected a leader, who was coached to proceed in (a) a democratic, or (b) a supervisory manner, for the formulation of a group ranking.

3. All subjects then prepared individual re-rankings. Mean correlations were calculated for each of 4 experimental subgroups between (a) initial and group ranks, (b) group and final ranks, and (c) initial and final ranks (utilizing Z transformations based upon Rho's).

RESULTS: Correlations between group and final rankings disclose that final rankings of participatory followers bore greater resemblance to participatory group rankings than did final rankings of supervisory followers to the supervisory group rankings. Similarly, final rankings of participatory leaders showed greater similarity to participatory group rankings than did the final rankings of supervisory leaders to the supervisory group rankings. Other comparisons show that the final rankings of both participatory followers and participatory leaders bore less relation to their own initial rankings than did the final rankings of supervisory subjects (both followers and leaders) to their own initial rankings.

CONCLUSIONS: 1. A leadership program which utilizes a participatory approach is shown to alter preferences to a greater extent than a program utilizing supervisory procedures, in the direction of group-defined preferences.

2. Reliable differences can be secured with very brief instruction of leaders.

3. A procedure for the laboratory-class study of leadership has been demonstrated to be workable. (Slides)

11:25 AM Leadership and its prediction from several levels of performance. *Launor F. Carter, University of Rochester.*

Recently considerable interest has centered on the "leaderless group" technique of assessing leadership and in some programs it has replaced the more traditional testing procedures. In the research to be reported, the same subjects have been assessed at three levels of performance. The subjects were 100 high school senior men, selected in equal numbers from two large schools. First, the leadership experience of each boy was rated by two raters in each school, and by the boys themselves using the nominating technique. The actual performance of each boy was also determined by ascertaining the number of "leadership positions" he had held. The second step in the research employed three "leaderless group" situations in which one boy from each school worked as a member of a pair on three different miniature work-tasks. The work-tasks were chosen to represent respectively intellectual, clerical, and mechanical-assembly situations. Finally, each boy took a six-hour battery of paper-and-pencil ability, aptitude and personality tests. The results are analyzed in terms of the intercorrelations between the different measures mentioned in

each of the three steps outlined above. Miss Mary Nixon has been an active collaborator in this work. (Slides)

11:40 AM Group interaction in a learning situation.

Herbert Gurnee, Arizona State College.

PROBLEM: To measure the effect of collective action when two groups of human subjects react simultaneously to a situation for which they have previously acquired different patterns of response.

POPULATION: Fifty-six college freshmen of both sexes, divided into two equal groups.

PROCEDURE: Each group was given six trials with a bolt-head maze; reactions were collective, by acclamation, and the majority vote was contacted after each trial. The pattern of correct bolt-heads differed at certain choice-points for the two groups. Individual responses were obtained after the sixth trial. The groups were then combined and reacted collectively for ten more trials; majority votes were recorded but *not* contacted, thus learning in these trials had to come entirely from the group. Individual responses were recorded after trials ten and sixteen.

RESULTS: On choice-points which were identical for the two groups, a significant decrease of errors occurred during the combined trials. Social facilitation was thus indicated. On choice-points which differed for the two groups, the effect varied from one group to the other; over thirty per cent of Group A's responses shifted to the Group B pattern, whereas only four per cent of Group B's responses shifted to the Group A pattern. Among the variables related to the difference, leadership seemed to be the most significant.

CONCLUSIONS: Social facilitation occurs in the acquisition of community patterns and in the resistance of such patterns to out-group pressures. Degree of facilitation in both respects seems to be largely a function of leadership variables. (Slides)

SYMPOSIUM: TRAINING AT THE PROFESSIONAL LEVEL IN SOCIAL PSYCHOLOGY

1:40 PM, Thursday, Ballroom

Jointly organized with the Society for the Psychological Study of Social Issues

RONALD LIPPITT, Chairman

Participants: Theodore Newcomb, J. Harding, Clarence R. Carpenter, Wayne Dennis

SYMPOSIUM: CLINICAL PRACTICE AND PERSONALITY THEORY

8:50 AM, Friday, Ballroom

SAUL ROSENZWEIG, Chairman

Jointly organized with the Division of Clinical and Abnormal Psychology

Participants: D. W. MacKinnon, A. W. Combs, G. S. Klein

SYMPOSIUM: THE VALUE OF "SOCIAL ROLE" FOR INTERDISCIPLINARY SYNTHESIS

1:40 PM, Friday, Ballroom

S. STANSFELD SARGENT, Chairman

Paper: Theodore Newcomb

Participants: N. A. Cameron, R. Linton,
Roland Warren

PERSONALITY ASSESSMENT

8:50 AM, Saturday, Assembly Room

Volunteered papers selected by the division

DONALD W. MACKINNON, Chairman

8:50 AM The assessment of psychiatric aptitude from the TAT. *Robert R. Holt, The Menninger Foundation.*

PROBLEM: To devise and obtain preliminary validation for a method of assaying important aspects of psychiatric aptitude using the TAT.

POPULATION: 20 physicians who have finished internships and are seeking specialty training at the Menninger Foundation School of Psychiatry; and 10 recent graduates of the school.

PROCEDURE: 10 cards of the latest edition of the TAT were given with the usual instructions, stories being electrically recorded with the subjects' knowledge. The 10 graduate psychiatrists were subjects of intensive personality study as part of a larger research project in the assessment of neuropsychiatric professional personnel. Their stories were searched for aspects which were related to component abilities and qualities making up general psychiatric aptitude. The resulting list of 15 variables was validated by applying them to the analysis of the TAT's of the candidates who applied for entry to the July 1948 class of the MFSP. Each of these doctors had been given independent ratings on general psychiatric aptitude by three psychiatric interviewers, and by another psychologist on the basis of a battery of tests not including the TAT. On the basis of these ratings, the 10 most and the 10 least psychiatrically adept of the 55 were selected by my colleague, Lester Luborsky, who did most of the testing; names and identifying data were concealed.

RESULTS AND CONCLUSIONS: Preliminary results indicate that an analysis of formal aspects of TAT productions—such as subtlety of motivations depicted, adequacy of heroes, clarity of story structure, fluency and appropriateness of verbalization—seems more fruitful for the present purpose than thematic (content) analysis. Results will be presented with conclusions about personality characteristics which seem to predispose to adequacy as a psychiatrist.

9:05 AM Standardized situations as a means of personal-

ity appraisal. *William F. Soskin, University of Michigan.*

PROBLEM: To study the contribution of standardized "Situation Tests" as part of a battery of procedures in personality appraisal, and the factor of rater differences as they effect this contribution.

POPULATION: (1) 128 male graduate students applying for training in the VA Clinical Psychology Training Program, and (2) nine of the 18 psychologists and psychiatrists who served as judges in the VA Assessment Project in the summer of 1947.

PROCEDURE: (1) In the fore-part of each of the six week-long periods subjects were studied by three judges (Team A) utilizing academic records, interviews, autobiography, objective and projective tests, and after team discussion each candidate was rated on a scale of 31 traits (Preliminary Pooled Rating, PPR). The following day Team A observed these subjects in four types of situation tests. The subjects were simultaneously observed in Situation Tests by Team B judges who had no previous information about the subjects. Team B members independently of each other rated each subject on the 31 traits. Subsequently Team A studied additional information and, by discussion, arrived at a Final Pooled Rating (FPR) for each subject on the 31 traits. These FPRs are used as the criterion against which Team B ratings were evaluated. (2) The ratings of nine judges from B teams were studied to discover whether differences exist in ability to rate from situation tests.

RESULTS: (1) Ratings based on Situation Tests only are significantly correlated (1% level) with FPR on all 31 traits. (2) In general the A-team's PPRs show a higher correlation with FPRs than do B-team ratings (from situation tests). This is not true on all traits, however. (3) Analysis of variance discloses differences significant at the 1% level both between B-team raters and between traits. When B-team raters are divided into a High and Low group, the two groups differ more in ability to rate so-called "genotypical" traits than in ability to rate so-called "phenotypical" ones.

9:20 AM The Army adaptation of the Minnesota Multiphasic Personality Inventory. *Mary A. Morton, Personnel Research Section, AGO.*

PROBLEM: To determine the predictive value of Army adaptation of the Minnesota Multiphasic Personality Inventory.

POPULATION: Two populations were used: 3456 enlisted men and 374 WAC applicants.

PROCEDURE: The Army adaptation of the Minnesota Multiphasic Personality Inventory, TC-8a, was administered to determine its value as a predictor of (1) rejection for Arctic assignment, (2) acceptance and successful completion of WAC basic training without evidence of maladjustment, and (3) of AWOL's and psychiatric referrals.

(1) Scores achieved on MMPI by candidates accepted for Arctic assignment were compared with those rejected upon recommendations of medical and other officers, (2) From 374 scores made by WAC applicants on the MMPI and on three other measures of personality, selection was made of scores of 59 WAC applicants who completed basic training with no evidence of maladjustment for comparison with those of 27 applicants rejected for WAC duty or identified as poor risks during basic training, (3) Scores made on MMPI during second week of basic training by 47 enlisted men who became AWOL's and 69 who became psychiatric referrals were compared with those for control groups.

RESULTS: Three scales of the MMPI proved highly significant as predictors of acceptance for Arctic duty. Seven scales predicted AWOL's and psychiatric referrals. As predictors of acceptance and successful completion of WAC basic training only 2 scales of MMPI were effective. None of the other three instruments proved significant. **CONCLUSIONS:** When measured by the criteria available in this study, the Minnesota Multiphasic Personality Inventory is of demonstrated value for Army use. Further research is necessary to determine whether differential weightings will increase its predictive value for acceptance and success in the WAC.

This study was made with the collaboration of G. Hamilton Crook and Bruce Berman.

ATTITUDES

10:00 AM, Saturday, Assembly Room

Volunteered papers selected by the division

RICHARD S. CRUTCHFIELD, Chairman

10:00 AM Attitude stability and change; a re-interview study of the national population. *Angus Campbell, University of Michigan.*

PROBLEM: To what extent do the attitudes of individuals in the national population change over a period of months on questions of world affairs and to what extent are they aware of changes which occur?

POPULATION AND PROCEDURE: During 1946 and 1947 the Survey Research Center of the University of Michigan conducted a series of four national surveys of public opinion on issues of world affairs. In November 1947 a sub-sample of the respondents of these surveys was designated and an effort was made to locate and re-interview them. Four hundred and sixty-two persons were re-interviewed. Several questions which had been asked previously were asked again and in each case the respondent was asked whether he believed he had changed his attitude since the earlier interview.

RESULTS: Data will be presented regarding the extent of change in attitudes and the degree of awareness of these changes. Data concerning the reliability of report of personal items such as age, education, income, and occu-

pation will also be given. An analysis of the representativeness of the re-interviewed group will be made. (Film)

10:15 AM Restructuration of attitude following a national election: the *fait accompli* effect. *Sheldon J. Korchin, VA, Philadelphia.*

PROBLEM: In the months preceding a presidential election tension rises and opinions become crystallized as vote decisions are reached. This paper is an investigation of the course of partisan attitudes after the election, when the election of one candidate is an accomplished fact.

POPULATION AND PROCEDURE: During the last week of October, 1944, 2,564 persons, a representative sample of the civilian voting population, were personally interviewed by the field staff of the National Opinion Research Center. Shortly after the November elections 2,030 of these same respondents were reinterviewed.

RESULTS: Comparison of pre-election and post-election scales of intensity of attitude toward the major candidates reveals a significant shift after the election toward support of the winning candidate. Democrats became more intense in support of their candidate, Republicans moved toward neutrality, while those previously undecided moved in a pro-Democratic direction. Thus, the pre-election U-shaped distribution of intensity of support shifted in the direction of a J-curve. In general, the relative positions of respondents on the two scales remained unchanged. The less ego-involved voters of both parties tended toward more moderate post-election positions.

In addition to these post-election attitude changes there is evidence for longer term memory changes. This and other studies show increasing numbers of people each year remembering having voted for the victorious candidates of past elections. These two phenomena—the shift in intensity of support and the longer range memory changes—are considered to be related parts of a “*fait accompli* effect.”

CONCLUSIONS: These results support Cantril's contention that an “accomplished fact may shift opinion in the direction of acceptance.” This *fait accompli* effect is a characteristic of the American culture which lends stability to the American political system. Its operation is discussed in the light of the psychology of conformity behavior and of recent research in perception and memory.

10:30 AM Personal values as determinants of a political attitude. *M. Brewster Smith, Harvard.*

PROBLEM: An analysis of the circumstances under which personal values may become determinants of a political attitude.

POPULATION: A representative cross-section of 250 adult men in an urban New England community, interviewed at their homes in May, 1947.

PROCEDURE: The interview questionnaire explored systematically the respondents' attitudes toward Russia, and certain personality characteristics thought to be

associated with these attitudes. An open-ended question designed to get at the respondents' personal values was included. Two of the three most frequent categories of response to this question were selected as potentially relevant to attitudes toward Russia: *liberty* and *economic security*. For each of these categories, men who gave an answer so classified were compared with those who did not, in respect to their other responses.

RESULTS: The value of *liberty* was found to be related to attitudes toward Russia in some important respects, while no relationship was found in the case of *economic security*. Other data indicated major differences in the bearing of the two values for attitudes toward Russia: (1) In contrast with those who stressed some aspect of *liberty*, men who singled out economic security showed a narrower scope of interests. (2) The prevalent conception of Russia was that of a totalitarian dictatorship. Only a few of the men evidenced awareness of Russian social welfare policies.

CONCLUSIONS: Two conditions are suggested as necessary in order that one of a person's central values may influence his attitudes toward an object: (1) The value must entail a scope of interests broad enough to include the object. (2) The object must be conceived in such terms that it is relevant to the value.

10:45 AM Expectations and buying intentions of consumers. *George Kalona, University of Michigan.*

PROBLEM: Among the psychological factors influencing economic behavior expectations play a major role. Both from the point of view of economics (theory of economic behavior and prediction of future developments) and psychology (analysis of formation of decisions) the following, possibly interrelated, questions arise: what is the relation of expressed expectations (and intentions or plans) to subsequent actions, and what is the origin of expectations?

POPULATION AND PROCEDURE: The problem was studied with respect to consumer expectations by means of large-scale sample interview surveys, repeated over three years and intended to determine both attitudes and financial facts (Surveys of Consumer Finances conducted by the Survey Research Center of the University of Michigan for the Federal Reserve Board). Expectations as to prospective income, prices, general economic developments, purchase of automobiles, other durable goods and houses, and savings were studied.

RESULTS AND CONCLUSIONS: Consumers do plan ahead with respect to certain of their activities. The larger the prospective purchase, the better indications of future purchases are the expressed buying intentions. The role and function of income and price expectations and of people's general economic outlook can be studied by determining their relation to buying intentions and prospective expenditures and savings. It appears that during the past few years some of those expectations exerted

a powerful influence, while others did not. Which is the case depends probably on the stability and origin of the expectations.

The study of the function and predictive value of consumer expectations is still in a developmental phase. Yet the results already obtained justify continuation of large-scale research and communication of preliminary findings to other groups. Specifically, it is no longer doubtful that intensive interviewing is a suitable method to attack psychological problems of economic dynamics.

PERSONALITY

11:10 AM, Saturday, Assembly Room

Volunteered papers selected by the division

R. NEVITT SANFORD, Chairman

11:10 AM The relationship of certain personality traits to errors and correct responses in several types of tasks among college women under varying test conditions. *Virginia M. Staudt, Notre Dame College.*

PROBLEM: This research was designed to investigate the following hypotheses: (1) A positive relationship exists between error-producing tendencies and personality characteristics related to maladjustment. (2) A negative relationship exists between correct responses and personality characteristics usually related to maladjustment. (3) There are changes in relationship between personality characteristics and errors under varying conditions of test administration.

POPULATION: 120 female college students.

PROCEDURE: Two cancellation tests and tests of Verbal Analogies and Arithmetical Operations were administered. Three forms of each test were used, Forms A and B being given under Normal conditions and Form C being given under varying experimental conditions, for which purpose the subjects were divided at random into three groups, Control, Accuracy and Tension. All subjects took an intelligence test, two perseveration tests and the Minnesota Multiphasic Personality Inventory (Group). Analyses were then made to determine the relationship of personality trait scores to the incidence of errors and correct responses under Normal conditions; and the change of such relationships under the different experimental conditions. In addition, a comparison of the correlation coefficients for errors and correct responses with personality traits was made. Finally, the data were analyzed in terms of the proportion of errors to the amount of work completed.

RESULTS AND CONCLUSIONS: (1) The more maladjusted the individual, as indicated by the Total Adjustment score, the more errors she made in habitual and more complicated perceptual tasks.

(2) The Neurotic and Schizophrenic Patterns, as measured in this study, correlated significantly with errors in

habitual tasks, such as addition and multiplication in the Arithmetical Operations Test.

(3) The Schizophrenic Pattern, as herein measured, is significantly related to errors of commission in tasks that are of a complicated perceptual nature.

(4) Perseveration was found to be a significant error-producing factor.

(5) There is little change of relationship between errors on relational and habitual material and personality traits under the different experimental conditions.

(6) Errors tend to be more significantly related to personality traits than correct responses are.

(7) The ratio of errors to items completed (E/C) is highly related to the number of errors (E) made on a test. Consequently, the partial analysis of the data in terms of the E/C ratio did not contribute appreciably to the results obtained by the use of the error scores alone.

11:25 AM Frequencies in certain categories of manifest content and their stability in a long dream series.

Calvin S. Hall, Western Reserve University.

A two-year dream diary consisting of every dream which could be recalled by the dreamer, an adult in his fourth decade, making a total of 200 dreams has been made available to the writer.

An analysis of certain features of the literal features of the dreams, e.g. dream characters, settings, and themes, will be presented and related to some propositions which have been formulated by Freud in his theory of the dream.

When the frequencies in the several categories for the 100 dreams of the first year are compared with the 100 dreams of the second year a high degree of consistency (reliability) is obtained. The incidence of the various types of themes, settings, and characters is practically identical for the two halves of the series in most instances, despite changes in the external circumstances of the dreamer during the two-year period.

The theoretical significance of these findings especially as they bear upon the stability of personality dynamics, and the implications they have for some assumptions underlying the use made of projective methods will be discussed.

11:40 AM Performance as a function of expressed and non-expressed levels of aspiration. *James A. Bayton, Howard University.*

PROBLEM: Two hypotheses are tested. (I) As aspirations become more specific there will be an increase in performance. (II) Expressing aspirations is associated with increase in level of performance.

Miss Doris E. Armstrong assisted throughout the experiment.

POPULATION: 79 male undergraduates randomly assigned to four groups.

PROCEDURE: The task was the Minnesota Rate of Manip-

ulation Test. Each of seven trials consisted of the placing test immediately followed by the turning test. Group I—No performance scores were given the Ss and no aspirations were obtained. Group II—fictitious performance scores were given after each trial but no aspiration instructions were given. Group III—fictitious performance scores were given and Ss set aspirations for succeeding trials but did not report them to E. Group IV—same as Group III but Ss reported aspirations to E. RESULTS: The rank order for rate of improvement during the first four trials was Group IV, Group III, Group II, Group I. Significant differences ($P = .05$) occurred, however, only between Groups I and III, and between Groups I and IV. There were no significant differences for rate of improvement in the last trials. The rank order positions (above) were maintained for mean performance on trials 3 through 6.

CONCLUSIONS: Establishing specific aspirations, whether expressed or non-expressed, creates more rapid learning in the early trials than occurs in a relatively unstructured learning situation (Group I). The other results are in the direction of the hypotheses but are not statistically reliable. It is suggested that the degree of ego-involvement created by the task affected the results. (Slides)

11:55 AM An approach to language behavior through a test of word meanings. *Henry S. Odbert, Dartmouth.*

PROBLEM: To explore the usefulness of a new test of word-meanings as a tool for semantic analysis.

POPULATION: 548 tenth-grade students.

PROCEDURE: Subjects read five test sentences, each containing the same underlined word, and then judged, for each sentence, which of four "key" sentences was using the word most nearly in the same sense. Thus, each of five sentences using the word "good" was matched with one of four key sentences using the same word. Nineteen such groups of sentences were studied. The test was kept within the vocabulary of Basic English to minimize the influence of range of vocabulary. Results were analyzed for patterns of response within groups of sentences.

RESULTS: Subjects who selected different answers to one item tended to make consistently different answers to other items. Some students were more open than others to misleading suggestions from the structure and the content of sentences. Where two interpretations of a sentence in different contexts were possible, some students were more successful than others in selecting the more "probable" interpretation. Examination of other sentences in the test suggests the nature of these alternate interpretations. Responses to such words as "good," "may," and "is" will be used to illustrate the sorts of information about language behavior yielded by the test. DISCUSSION: Questionnaires similar in structure to this, with key sentences carefully selected for specific purposes, may furnish useful information on the development of

discrimination in meanings with age, and on what I. A. Richards refers to as the "interanimation of words." They may shed light on current generalizations about the influence of sentence structure on interpretation. They should also be adaptable to the obtaining of information

about the extent of agreement on crucial words in specific contexts. For such purposes, key sentences should probably be pretested for assurance that the word in question was generally interpreted within a narrow range of common meanings. (Slides)

SOCIETY FOR THE PSYCHOLOGICAL STUDY OF SOCIAL ISSUES

SYMPOSIUM: MEETING OF THE COUNCIL

10:00 AM, Monday, Assembly Room

Open to all members

SYMPOSIUM: MEETING OF THE COUNCIL

1:40 PM, Monday, Assembly Room

Open to all members

PRESIDENTIAL ADDRESS

7:00 PM, Monday, Ballroom

HADLEY CANTRIL: (Title to be announced)

Business meeting following

ANNUAL MEETING OF THE COMMITTEE ON INTERGROUP RELATIONS

8:00 PM, Tuesday, Georgian Room

Open session

SYMPOSIUM: VALUES FOR SOCIAL PSYCHOLOGISTS

4:00 PM, Wednesday, Georgian Room

GORDON W. ALLPORT, Chairman

Participants: David M. Levy, Else Frenkel-Brunswik

SYMPOSIUM: TRAINING AT THE PROFESSIONAL LEVEL IN SOCIAL PSYCHOLOGY

1:40 PM, Thursday, Ballroom

Jointly organized with the Division of Personality and Social Psychology

RONALD LIPPITT, Chairman

Participants: Theodore Newcomb, John Harding, Clarence R. Carpenter, Wayne Dennis

SYMPOSIUM: OBJECTIVES AND RESEARCH FORMULATIONS IN THE PSYCHOLOGICAL STUDY OF INDUSTRIAL RELATIONS

4:00 PM, Thursday, Ballroom

ARTHUR W. KORNHAUSER, Chairman

Participants: Douglas McGregor, W. J. Goode, Ross Stagner

ANNUAL MEETING OF THE COMMITTEE ON ATOMIC EDUCATION

1:40 PM, Friday, Georgian Room

Open session

PRESENTATION OF THE KURT LEWIN MEMORIAL AWARD

4:00 PM, Friday, Georgian Room

DONALD W. MACKINNON, Chairman

Speaker: General George Brock Chisholm, Director of the Interim Committee on World Health Organization

PRESENTATION OF THE EDWARD L. BERNAYS ATOMIC ENERGY AWARD

5:00 PM, Friday, Georgian Room

DAVID KRECH, Chairman

DIVISION ON ESTHETICS

7:00 PM, Tuesday, Parlor D

A. Selected Paper: Robert E. Dreher: The relationship between verbal reports and galvanic skin responses to music.

PROBLEM: The purpose of this study was to investigate the relationship between subjects' mood descriptions and galvanic skin responses to music.

POPULATION: The responses of 33 college music students were compared with those of 33 college students who

rated themselves low on general musical background, interest and training.

PROCEDURE: Subjects' galvanic skin responses were measured with a standard electronic galvanometer during the playing of eight short, complete piano recordings. Their

mood descriptions of these records were obtained at the conclusion of each selection through the use of Hevner's "Adjective Circle."

RESULTS: 1. The verbal responses of trained and untrained subjects to musical stimuli were markedly similar, though trained subjects checked more adjectives on the Adjective Circle and showed less variability in their checking. 2. In comparison with the untrained group, the trained group had significantly greater rises in level of resistance before, during, and after each record. This was interpreted to represent its greater "at-homeness" in listening to music. Trained subjects also showed significantly greater momentary decreases in resistance (GSR's) during the music, indicating their generally greater responsiveness to music. 3. In all of the analyses, the galvanic responses of the trained subjects were

related to the mood descriptions of the records. This was shown by high positive correlations between GSR's and "intensity" of mood description and high negative correlations between rise in resistance level and mood descriptions. 4. In none of the analyses for untrained subjects was any relationship between mood and rise in resistance or mood and GSR established.

CONCLUSIONS: The results for the trained group were interpreted to represent a differential esthetic responsiveness—built up in the course of musical training—to the moods of musical stimuli. The absence of such differential responsiveness in the untrained group, despite its ability to make gross differentiations of musical moods, was interpreted as a lack of esthetic response to music. (Slides)

B. Presidential Address: PAUL R. FARNSWORTH: Psychological Considerations of Musical Taste

DIVISION OF CLINICAL AND ABNORMAL PSYCHOLOGY

SYMPOSIUM: PROBLEMS OF INTERPROFESSIONAL RELATIONSHIPS

10:00 AM, Monday, Ballroom

JAMES G. MILLER, Chairman

Participants: Chester C. Bennett, Margaret Brenman, Harold M. Hildreth, J. McV. Hunt

SYMPOSIUM: PROBLEMS OF COLLABORATION BETWEEN THE CLINICAL CENTER AND THE PSYCHOLOGY DEPARTMENT IN PROVIDING CLINICAL EXPERIENCE

1:40 PM, Monday, Ballroom

CARLYLE JACOBSEN, Chairman

I. J. Cohen, representing the outpatient clinical center
R. E. Harris, representing the inpatient clinical center
John G. Darley, representing the clinical center on the university campus

Karl Heiser, representing the university psychology department

Florence Day, representing the field of psychiatric social work education

This symposium will discuss the problems of collaboration between various kinds of clinical centers and the university psychology department in arranging adequate experience for graduate clinical psychology students. Each type of clinical center, as well as the psychology department, will be represented. A representative from the field of psychiatric social work education will discuss the implications for clinical psychology of the extensive experience that schools of psychiatric social work have had in collaborating with field work training agencies.

EXPERIMENTAL APPROACHES TO CLINICAL PROBLEMS

8:50 AM, Tuesday, Assembly Room

Volunteered papers selected by the division

WILLIAM A. HUNT AND JOSEPH ZUBIN, Chairmen

8:50 AM A comparison of critical flicker frequency in psychotics, psychoneurotics, and normals. *Henry N. Ricciuti, Fordham University.*

PROBLEM: 1. To determine whether differences in visual critical flicker frequency (CFF) exist among schizophrenics, manics, depressives, psychoneurotics, and normals. 2. To determine whether Wiersma's hypothesis that manics have the weakest, and depressives the strongest "secondary function" or perseveration, can be verified.

POPULATION: The clinical group consisted of 42 hospitalized psychoneurotics and 75 psychotics in the following categories: 46 schizophrenics, 15 manics, and 13 depressives. A comparable control group of 54 normals was utilized.

PROCEDURE: An electronic flicker apparatus with a frequency accuracy of .5% was utilized in the study. CFF measures for one eye were obtained by means of a recently developed method, to be described in the paper, yielding extremely reliable measures even for psychotics. Mean CFF measures for each group were computed, and the reliability of the obtained differences was evaluated by means of the *t* ratio.

RESULTS: The mean CFF obtained for the normals was slightly higher than the means obtained for each of the abnormal groups, but the only difference found to be statistically reliable was that between the normals and manics, which was significant at the 5% level. There

were no reliable differences found between mean CFF values of any of the abnormal groups. Differences in intra- and inter-individual variability will be discussed in the paper.

CONCLUSIONS: 1. No significant differences in CFF exist between normals and schizophrenics, depressives, or psychoneurotics. 2. No significant differences in CFF exist among manics, depressives, psychoneurotics, and schizophrenics. 3. There is some evidence, which warrants further investigation, that the CFF of normals is significantly higher than that of manics. 4. Wiersma's hypothesis that manics have the weakest, and melancholics the strongest "secondary function", is not verified insofar as evidence based on CFF is concerned. (Slides)

9:10 AM Visual resolving capacity in schizophrenia.
George S. Klein, The Menninger Foundation. (Abstract exceeded 300-word limit).

9:30 AM The relationship between particular Rorschach determinants and the concomitant galvanic skin responses for schizophrenic and normal subjects.
Carl F. Frost, Massachusetts Institute of Technology and Eliot H. Rodnick, Worcester State Hospital.

PROBLEM: This investigation is concerned with the differences between schizophrenic and normal subjects in the relationship between form-associated responses on the Rorschach test and the concomitant galvanic skin responses.

POPULATION: Twenty normal males and twenty schizophrenic male patients at the Worcester Hospital, comparable in age and education, were used.

PROCEDURE: A graphic record of the continuous galvanic skin responses was obtained during the administration of the Rorschach test by the use of an ink-writing photoelectric recorder and a modification of the Darrow bridge circuit, thus permitting the direct determination of the relationship between the magnitude of GSR and particular Rorschach determinants.

RESULTS: The normal subjects showed significantly larger GSRs with form-dominant responses than did the schizophrenics. For normal subjects, the GSRs on the form-dominant responses were significantly larger than those obtained on form-subordinant responses. This trend is significantly reversed for the schizophrenics. Related differences were found in other determinants. Although the mean GSR is less for the schizophrenic than for the normal subjects, the differences occur only on those determinants which involve control. On other determinants the GSRs of the schizophrenics are as large or even larger than those of the normals.

CONCLUSIONS: Control factors in the Rorschach responses are related to the level of concomitant GSR activity. Schizophrenics differ from normal subjects in the nature of this relationship, particularly in terms of a capacity to control and modify needs in meeting reality demands. (Slides)

9:50 AM Psychological test performance and insulin shock treatment. *Abraham Carp, Stanford University.* (Abstract exceeded 300-word limit).

10:10 AM Reduction in general intelligence following frontal gyrectomy and frontal lobotomy in mental patients. *Robert B. Malm, McGill University and Allan Memorial Institute of Psychiatry.*

The assistance of Miss Joan E. Coulter, Mrs. Norma R. Swinburne, and Mrs. Barbara Wickett is gratefully acknowledged.

PROBLEM: (1) To determine the effect of frontal lobe operations upon general intelligence. (2) To investigate specific, qualitative aspects of behavioral changes following operation.

POPULATION: Seven cases of bilateral frontal gyrectomy and eight cases of frontal lobotomy were studied before and after operation. These cases represented a remarkable opportunity for psychological study of frontal lobe function, because they had not reached a pre-operative state of personality deterioration, and because (in the gyrectomy series) clearly delineated frontal lobe areas were removed.

PROCEDURE: A battery of standardized psychometric tests was employed, and the results were analyzed quantitatively and qualitatively. Observations of the patient's behavior in everyday life situations provided important correlative data.

RESULTS AND CONCLUSIONS: (1) A consistent drop in general intelligence, as measured by the Wechsler-Bellevue Intelligence Scale, was found following operations. (2) There were significant reductions in Vocabulary Scores. Changes in the direction of greater concreteness of definition were noted postoperatively. (3) There were individual differences in amount of deficit which could not be accounted for very well in terms of extent and location of removal of brain tissue, or in terms of dysfunction. (4) One psychological factor which appeared to play a major rôle in producing individual differences was that of the patient's interests. (5) It was concluded that the balance of evidence at the present time favors an interpretation of the observed deficit in terms of a reduction in ability to maintain set in the face of interference. (Slides)

10:30 AM Intellectual changes in schizophrenic patients following electric shock therapy. *Lucille B. Kessler, Traverse City State Hospital.*

PROBLEM: The object of the present investigation was to note any changes in the Wechsler-Bellevue patterning of a group of unselected electroshock-treated schizophrenics.

POPULATION: Twenty fully cooperative patients of the various sub-classifications were accepted.

PROCEDURE: Within the first week of hospitalization, each patient was administered the entire Form I, ex-

cluding Vocabulary. Retesting was done at least two weeks after the shock series was completed. Comparison of the results involved IQs and sub-test scores, including an item analysis, pattern analysis and qualitative differences. Psychiatric impressions of each patient's post-shock condition were correlated with those indicated by testing.

RESULTS: The principle results included greatly improved IQ ratings on all three scales, greatest variability in Picture Arrangement, most significant increases in Comprehension and Picture Completion, moderate improvement in Picture Arrangement, Similarities and Arithmetic, Critical Ratios of 0 or near 0 for all other sub-tests, typical schizophrenic patterns for the group on the whole, with the exception of Object Assembly, decided decline in bizarre thinking and considerable room for improvement as evidenced by sub-average scores on all sub-tests save Information and Object Assembly.

CONCLUSIONS: The reduction in bizarre, incongruent thinking, better attention and increasing social awareness were believed to be important factors in the favorable results revealed by the Wechsler-Bellevue Scale.

10:50 AM The measurement of physiological responses to frustration before and after non-directive psychotherapy. *William N. Thetford, University of Chicago.*

PROBLEM: The purpose of this study was to investigate the relationship between the physiological response patterns of a group of subjects during a frustrating situation before and after a series of non-directive counseling interviews, and to compare their reactions to their personal problems. Some of the assumptions made were as follows: 1) The emotionally unstable person is more easily frustrated than the well-adjusted person. The ease with which he can be frustrated and the intensity of his reactions under frustration may be used as an indication of the nature and degree of his emotional stability. 2) The responses of a subject to a frustrating laboratory situation are similar to those which he displays in other critical situations. 3) Individuals requesting help from the Counseling Center at the University of Chicago do so because of some internal stress. It was hypothesized that if therapy enables the individual to reorient his lifepatterns, the manner in which he responds to a stress situation, as indicated by the autonomic nervous system reactivity, should be significantly altered by this therapy.

POPULATION: Clients in individual and in group therapy at the University of Chicago Counseling Center.

PROCEDURE: The physiological responses of individuals undergoing individual and group therapy, as measured by their galvanic skin response, heart and respiration rate, were compared before and after their entire series of therapeutic contacts. The same measurements were employed on a control group.

RESULTS: A significant decrease in emotionality, as indicated by certain of the physiological measures, was observed in the post-therapy test given to the experimental group, while such changes were not apparent in the control group.

CONCLUSION: Physiological measures may be utilized in the manner of this study to reveal significant effects of psychotherapy.

11:10 AM Certain aspects of personality as related to the electroencephalogram. *Erma T. Wheeler and Y. D. Koskoff, University of Pittsburgh.*

PROBLEM: The assumption that cerebral dysrhythmia and personality disturbance are correlated has frequently been expressed by members of the medical and psychological professions. The problem of the present study involves an investigation of this hypothesis.

POPULATION: Forty-eight non-institutionalized idiopathic epileptics with no detectable organic brain involvement were chosen as subjects for the study since the incidence of both personality disorder and cerebral dysrhythmia among epileptics is very high. Those subjects showing no dysrhythmia should, according to the hypothesis, show a minimum of personality disturbance while other dysrhythmic members should manifest a degree of disturbance commensurate with some type or degree of dysrhythmia.

PROCEDURE: Electroencephalographic recordings were obtained for each subject, the results were quantified on the basis of frequency, and the subjects were grouped into five categories: Non-dysrhythmic, Slow I, Slow II, Fast I, and Fast II. An extensive battery of psychological tests was administered to each subject and the results quantified.

RESULTS AND CONCLUSIONS: Analysis of variance revealed that only one of the psychological tests differentiated any of the electroencephalographic groups in a statistically significant manner. The digit span sub-test of the Wechsler-Bellevue Scale revealed the Slow I and Fast I groups to be significantly below the Non-dysrhythmic group in the ability measured by this test.

Inspection of test means revealed certain consistent trends. There was a persistent trend for the Non-dysrhythmic group to show the least personality disturbance while making the most physical complaints.

The Slow II group persistently showed the most severe disturbance. This later finding might be expected when one considers the clinical viewpoint that psychomotor slow waves may be coming from sub-cortical foci. Where low I.Q. occurs in connection with slow waves as in the subjects of this group, one has further reason to suspect organic damage. (Slides)

11:30 AM An experimental approach to stuttering as learned behavior. *George J. Wischner, University of Missouri.*

Certain features of a *program of research*, designed as a systematic experimental approach to the problem of stuttering as learned behavior, are considered. Basic points of departure for the present program are provided by existing data concerning the rôle of expectancy and anxiety in stuttering behavior, and the adaptation and consistency effects (the tendency for frequency of stuttering to decrease in an orderly manner with repeated reading of the same material, and the tendency for loci of stuttering to remain constant from reading to reading, insofar as stuttering continues to occur). The methodology and terminology of the proposed learning frame of reference are derived largely from the field of conditioning and learning.

An empirical parallel has been demonstrated between stuttering adaptation and the experimental extinction of conditioned and unconditioned responses. This parallel has been extended by the demonstration in stuttering behavior of the analogues of such conditioning phenomena as spontaneous recovery of the stuttering response, and of disinhibition, external inhibition, and conditioned inhibition in relation to stuttering adaptation.

On the basis of findings from studies of expectancy and anxiety in relation to stuttering behavior, the general working hypothesis that stuttering behavior is a learned anxiety reaction system has been developed and elaborated. Data relevant to this hypothesis are being integrated with reference to learning and anxiety concepts drawn principally from the work of Mowrer.

The specificity and availability of the stuttering response would appear to afford an excellent opportunity for the study of mechanisms underlying not only stuttering behavior but also what has been referred to generally as non-integrative or maladaptive behavior.

A number of experiments stemming from the proposed research program have already been completed and the nature and results of certain studies will be indicated. (Slides)

CLINICAL AND ABNORMAL PSYCHOLOGY

1:40 PM, Tuesday, Assembly Room

Volunteered papers selected by the division

LAURANCE F. SHAFFER AND DAVID RAPAPORT,
Chairmen

1:40 PM A comparative analysis of the crimes of prejudiced and unprejudiced male inmates in a state prison, as related to their central emotional conflicts.

William R. Morrow, Menninger Foundation.

PROBLEM: To characterize in psychologically meaningful terms, in relation to central emotional conflicts, the different types of crimes committed by prejudiced and unprejudiced inmates of a state prison.

POPULATION AND PROCEDURES: (1) 110 male inmates,

representing all major legal offenses but excluding (most) men of low intelligence, psychotics, and minorities, took the Berkeley Ethnocentrism (E) Scale. This consists of 10 implicitly hostile statements about various minorities, with which the subject indicates his relative agreement or disagreement. E scores of major legal offense groups are statistically compared.

(2) 14 inmates with E scores in the high or low quartile were studied intensively by clinical interviews and analysis of prison case files: These included 8 "highs" (prejudiced) and 6 "lows" (unprejudiced). All but one (a high) were of average intelligence or better; socio-economically, both highs and lows ranged from lower lower class to upper middle class family background. Both highs and lows included representatives of each major legal offense group.

RESULTS AND CONCLUSIONS: (1) Major legal offense groups do not differ significantly in E score means, except that sex offenders have a higher mean than the others. (2) For the 14 inmates studied intensively, however, important differences emerged: Crimes of highs, without exception, seemed to express desperate attempts to prove masculinity: a) by "toughness" and/or "shortcuts" to external status or power; and/or b) by compulsive, "impersonal" heterosexual behavior of a hostile, exploitive character. Crimes of lows, with possibly one exception, seemed to express a mother-oriented quest for love and "mothering"—and sometimes explicitly self-interpreted as such by the inmate!—and/or ambivalence resulting from frustration of that quest. These differences coincide with differences in the central strivings of the high and low inmates: defensive attempts to deny weakness—versus—mother-oriented love-dependence. All 14 cases will be described briefly.

2:00 PM A study of personality structuring in spastic colitis. *Georgene H. Seward, The University of Southern California.*

PROBLEM: The present study is associated with a larger investigation designed to compare personality structuring in peptic ulcer, essential hypertension, and bronchial asthma. According to psychoanalytic theory spastic colitis frequently occurs in individuals who because of enforced submission during the period of anal training harbor resentments that conflict with their passive-receptive love needs. Their unconscious solution is to take forcibly the response he regards as having been unjustifiably withheld. The eliminative tendencies characterizing this syndrome have the dynamic meaning of restitution for his aggressions thereby serving to counteract anxiety and inferiority feelings.

This theory leads to the predictions that in comparison with the other conditions under consideration colitis cases will show evidence of:

1. more overtly expressed and extrapunitive directed aggression.

2. decreased inferiority feeling which permits freer expression of ambitious strivings.
3. less inner tension, anxiety and guilt.
4. less social sensitivity.
5. more anal components in sexuality.

POPULATION: A group of 30 men, 20-40 years of age, diagnosed as spastic colitis, served as subjects.

PROCEDURE: The Rorschach, T.A.T. and Rosenzweig Picture-Frustration Tests provided the chief measuring instruments. In addition, a special case history was devised to explore critical psychological areas.

RESULTS: Rosenzweig records show a predominance of extrapunitive reactions. Rorschach signs that seem to occur most consistently are unusually brief records, disproportionately high $W\%$, $W:M$ and $(H + A): (Hd + Ad)$ ratios. Conspicuous by their absence are m , k , and "burnt child reactions." T.A.T. and biographical material have not yet been analyzed.

CONCLUSIONS: Initial results lend support to most of the theoretical predictions. Definitive conclusions await comparisons with the other psychosomatic syndromes.

2:20 PM The Elgin check list of fundamental psychotic behavior reactions. *Phyllis Wittman, Illinois Department of Public Welfare.*

For this study the characteristics of what appear to be the three fundamental types of psychotic behavior reaction, affective exaggeration, paranoid compensation and schizophrenic regression, have been evaluated for 100 patients at the Elgin State Hospital.

A check list of the characteristics for the two extremes for each type of fundamental psychotic behavior, that is: (1) Euphoric Expansion and Depressive Constriction, (2) Somatic Aggression and Ideational Substitution and (3) under Schizophrenic Withdrawal the two extremes of Bizarre Irrelevant Affect and Paucity of Affect and Ideation.

The way in which the scale is used is described and the weightings arrived at independently by two different raters are correlated. Two cases both diagnosed as dementia praecox, paranoid type yet very different in the psychotic behavior reactions are discussed in terms of the psychotic behavior reactions displayed. The lack of significance for studies using diagnostic groups with such heterogeneity among the subjects in a given diagnostic category is outlined and the rationale for relatively objective evaluations that can be checked by others is discussed. (Slides)

2:40 PM Personality characteristics related to hypnotizability. *Roy Schafer, Austen Riggs Foundation, Stockbridge, Massachusetts.*

This study is aimed at clarifying the methodology of clinical research using psychological tests as well as contributing to the understanding of hypnotizability as a personality characteristic. The test results of a group

of excellent hypnotic subjects were compared with those of a group of very poor hypnotic subjects. A battery of tests was used. "Blind analysis" of the records disclosed certain relatively common personality characteristics in the very poor subjects, while statistical comparisons were unrevealing as well as at variance with previously published data. A follow-up study on a new group of subjects bore out these trends. The personality characteristics occurring frequently in the poor subjects and infrequently in the good subjects were: rigid obsessive-compulsive defenses, projective trend, easily provoked aggressions, denial of passive needs, emotional unadaptiveness, and narcissistic emotional orientation. Excessive reliance on repression was found to characterize about half of the good subjects.

3:00 PM The prediction of social acceptance by means of psychoanalytic concepts. *Doris R. Miller, Stanford University.*

PROBLEM: To investigate the relationship between the number of psychoanalytically defined signs of regression and conflict revealed in a story completion test and status on a sociogram.

POPULATION: 102 fourth to eighth grade students.

PROCEDURE: Story beginnings were constructed involving situations which symbolized potentially traumatic difficulties such as castration fears and oedipal conflicts. In a composition period, subjects were asked to write imaginative endings to each story. Using precautions to avoid halo effect, an individual who was untrained clinically and psychoanalytically unsophisticated scored the tests. Criteria were phrased as objectively as possible. For example, a point was scored for orality for each mention of oral, respiratory or tactual functions. The final score for each subject was the total sum of points for orality, anality, repression, frustration and introjectiveness-extrapunitiveness. The criterion consisted of a five group distribution of social status which was constructed from sociograms of rejection and acceptance.

RESULTS: The average sum of points was at a minimum in the leader group and increased for each group in the direction of the most rejected. The most significant single predictor of rejection was the inclusion of oral functions.

CONCLUSIONS: The number of signs of psychoanalytically defined conflict and pregenital adjustment obtained from a story completion test predicts successfully the degree of social acceptance by one's peers. The signs may be scored by a person lacking clinical and psychoanalytic training.

3:20 PM Wechsler-Bellevue "scatter" in schizophrenics and normal controls. *Albert Vincent Freeman, Columbia University.*

PROBLEM: Will "scatter" (defined as intra-individual

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variability) on the Wechsler-Bellevue Intelligence Scales differentiate (A) schizophrenic patients from normal controls, and (B) hebephrenic from paranoid schizophrenics? The theory underlying Rapaport's use of the Wechsler-Bellevue in clinical practice is that "disparity of efficiency... in an intelligence test is an expression of maladjustment...". The present research attempts to provide optimal conditions for validation of the scatter approach in diagnostic testing.

PROCEDURE: Two schizophrenic groups presenting grossly different symptomatology and one normal control group ($N = 25$ in each) have been matched for sex, age, race and educational attainment. By means of analysis of variance and covariance, the Wechsler-Bellevue subtest variability for each individual is calculated independent of the influence of mean level of test performance around which scatter occurs. Group comparisons are then possible.

RESULTS: The resultant data will be presented as follows:

- (1) group differences with respect to central tendency on verbal, performance and full Wechsler-Bellevue scales;
- (2) group differences in intra-individual variability on the three scales;
- (3) group differences in intra-individual variability (residual variance), when each group has been adjusted by covariance to an equivalent mean level;
- (4) differences as described in (1) above, when the verbal mean is held constant by covariance;
- (5) group differences in mean level of subtest performance when subjects are reduced to a common level with respect to intra-individual variability; and
- (6) amount of overlap between psychotic and normal groups, with respect to scatter.

CONCLUSIONS: Results obtained will be discussed in relation to the clinical impressions of Wechsler, the Rapaport theory stated above, and the findings of previous investigators (Magaret, Gilliland, Klein, Brogden and others). There will be included a consideration of criticisms which have been levelled against using Wechsler-Bellevue scatter as a diagnostic aid.

3:40 PM The predictive value of psychological tests in infancy; a report on clinical findings. *Sibylle Escalona, Menninger Clinic.*

POPULATION: The subjects of this study are infants who were referred to the Menninger Foundation for psychological study prior to adoption and were examined again after having been in adoptive homes for no less than one year. The report is based on a total of 113 psychological examinations, administered to 51 children.

PROCEDURE: The Gesell Developmental Schedules and the Cattell Infant Intelligence Scale were administered to infants below the age of six months. Formal testing procedures were supplemented by additional observations to be described, and test findings were evaluated qualitatively. The same children were retested (using the Cattell Infant Intelligence Scale and/or the Revised Stanford-Binet Intelligence Test) from one to three

times, after having been in adoptive homes for one year or more. Clinical observational procedures were added to the testing procedures proper on all occasions.

RESULTS: Though the number of cases is too small to permit adequate statistical treatment, the correlation between estimates of intelligence level obtained in early infancy and during the preschool years is better than published reports indicate. The data suggest that certain aspects of mental functioning can be predicted with greater accuracy than others and that the same formal test findings can be interpreted differently in the light of concomitant clinical observations, thus increasing the predictive value of psychological tests given in infancy.

CONCLUSIONS: Psychological examination of infants gains in usefulness when testing is integrated with other clinical procedures, and when findings are evaluated in the light of some general psychodynamic concepts as well as from a normative point of view. The relatively greater stability of some aspects of mental functioning, as compared to others, can be explained if a 'predisposition' towards certain modes of psychological experience is assumed to be present at birth.

4:00 PM Castration anxiety in an adult as shown by projective tests. *Richard Sears, VA Mental Hygiene Clinic, Detroit, Michigan.*

A case study is presented in which a series of projective tests, including the Rorschach, Bender-Gestalt (utilizing the method of verbalization suggested by Hutt), Good-enough "Draw-A-Man", Stein Sentence Completion, and TAT, together with some material from the Wechsler-Bellevue, bring out unusually clear-cut and unequivocal evidence of castration anxiety, and its dynamic interrelations with passive-dependent and latent homosexual trends, in a 28 year-old man.

The test results support the hypothesis that the dynamics of this castration material cannot be adequately explained by considering early childhood experiences to be of merely "historical interest" as might be the case if, due chiefly to "functionally autonomous" homosexual cravings, the patient wished to lose his genitals in order to be more like a woman. The test data supports the assumption that the patient is symbolically re-living the Oedipus situation, with inability to proceed to a satisfactory masculine identification because of anxiety aroused by the father figure and ambivalent feelings toward the mother.

Re-administrations of the Wechsler-Bellevue, Rorschach, and TAT after an interval of a year show basically similar test patterns, with certain changes which correlate well with observations made during therapy.

4:20 PM A study of the psychoanalytic theory of psychosexual genesis. *Gerald S. Blum, Stanford University.*

Many previous attempts made by psychologists to study psychoanalytic theory have been inadequate because they have failed to operate strictly within the psychoanalytic framework of the unconscious, repression, reaction formation, and the like. To meet this need for independent study of psychoanalytic theory by a psychoanalytically oriented method, the present modified projective technique was evolved. It consists of a series of eleven cartoons depicting the stages of psychosexual development and significant object relationships, including oral eroticism, oral sadism, anal sadism, the Oedipal situation, autoeroticism, castration anxiety, identification, sibling rivalry, guilt, ego ideal, and love object. The characters are a family of dogs and the main figure, Blacky, is presented as a male offspring to the male subjects and as a female offspring to the female subjects. Each cartoon is projected on a screen for two minutes and the group of subjects is asked to write a vivid, imaginative story concerning it. After the presentation of each cartoon, there is a set of multiple-choice and short-answer questions relevant to the psychoanalytic dimension under consideration. Finally, the subjects are asked to give their preferences for the various cartoons.

The test has been administered to approximately 120 male and 120 female elementary psychology students, with a view toward determining whether the obtained differences between the sexes correspond to the differences suggested by psychoanalytic theory. The subjects were naive with regard to psychoanalytic theory at the time of testing. Analyses of the data thus far completed reveal numerous sex differences (chi-squares significant at the 1% level) in such areas as degree of anal sadism, Oedipal intensity, guilt, ambivalence in identification, and others. These differences have been found generally to be consonant with psychoanalytic theory. (Slides)

SOCIAL HOUR

Arranged for members of the Division of Clinical and Abnormal Psychology, the Division of Industrial and Business Psychology, and their friends by the Division of Consulting Psychology

5:00 PM, Tuesday, Georgian Room

Hosts and Hostesses: Mr. and Mrs. F. Lyman Wells, Miss Louise Wood, Mr. and Mrs. Robert A. Young

PRESIDENTIAL ADDRESS

8:00 PM, Tuesday, Ballroom

David Shakow: Psychology and Psychiatry; a Dialogue.
Business meeting following

SYMPOSIUM: RECENT ADVANCES IN DIAGNOSTIC PSYCHOLOGICAL TESTING

8:50 AM, Wednesday, Ballroom

ARTHUR L. BENTON, Chairman

Participants: Robert E. Harris, George A. Muench, James G. Miller, L. Joseph Stone, Hans L. Teuber, Joseph Zubin

PROJECTIVE TECHNIQUES

1:40 PM, Wednesday, Assembly Room

Volunteered papers selected by the division

SILVAN TOMKINS, Chairman

1:40 PM Evaluation of a short form of Rorschach.
Richard A. Cutts, Veterans Hospital, Fort Custer, Michigan.

PROBLEM: To determine the feasibility of using a fewer number of the Rorschach cards to obtain valid findings which would compare with the results obtained by using only ten cards.

POPULATION: 50 Rorschach records of normal subjects, psychotics, and neurotics, were used.

PROCEDURE: Psychograms for each full Rorschach administration were obtained. Another psychogram on the same records but using only six of the cards was constructed. The six cards used were III, IV, VII, VIII, IX, X. Statistical procedures were applied to determine the significance of the differences.

RESULTS: With regard to such matters as F+%, A%, H%, F%, P%, S%, statistically insignificant differences were found between the two protocols. With regard to location areas differences were greater but showed a consistent trend making prediction feasible.

Analysis of the records indicate that it is possible to predict closely the sum C and various combinations of C on the basis of the six card record. The same situation appears to be true with regard to shading responses.

Movement responses showed a consistent tendency as did the range of content. Vista responses were less reliably picked up.

The number of responses on the six card records was approximately two-thirds of those on the full record. Contamination, confabulation, and position responses were not reliably picked up on the six card record, and predictions can not be made on these factors; however, they occurred very rarely in the 50 records. Bizarre responses usually occurred in the six cards when they occurred in the ten card record.

CONCLUSIONS: There are strong indications that differences between six-card Rorschach and the ten-card Rorschach for those items which are most usually quantified are not significant. Ratios between such factors as color, shading, movement, number of responses, and range of content appear to be consistent enough to make predictions.

2:00 PM A revision of the Murray TAT for use with a minority group. *Charles E. Thompson, Tulane University.*

PROBLEM: An experimental study of the Murray TAT revised for use with Negro subjects. In this study an answer was sought to the following question: Do Negro subjects react differently on the TAT when the pictures have Negro people depicted in them than when Caucasian people are portrayed?

POPULATION: Normal adult male veteran Negroes currently participating in an academic program within Dillard University, New Orleans, Louisiana.

PROCEDURE: The problem has been investigated by constructing a parallel series of TAT pictures identical to the Murray pictures (Nos. 1, 2, 4, 5, 6BM, 7BM, 8BM, 12M, 17BM, 18BM), but having the characters depicted as Negroes. Such a revision has been titled the Thompson-Dillard Revision of the Murray TAT. The obtained population was divided into two sections: Section I received the Thompson-Dillard Revision of the Murray TAT, Section II received the Murray TAT. Group administration of the test materials was the method used to obtain the data upon which this study is based.

RESULTS: The obtained data (to be presented) revealed a statistically significant difference between the protocols given to the pictures portraying Caucasians as compared with the protocols given to those pictures portraying Negroes.

CONCLUSIONS: Projection is in part a function of the stimulus presented. The literary productions given by the Negro for the Murray TAT material is, in part, a function of the white stimulus figures. When Negro figures are presented, as is done in the Thompson-Dillard Revision, different productions are given. (Slides)

2:20 PM Rorschach patterns in involuntional melancholia. *Isabelle V. Kendig and Claire M. Vernier, St. Elizabeth's Hospital.*

PROBLEM: The study was undertaken to determine whether typical Rorschach patterns exist for the Involuntional Psychoses.

POPULATION: One hundred women patients at Saint Elizabeth's Hospital, fifty white and fifty colored, twenty-five in each group being diagnosed as Involuntional Melancholia, twenty-five as Paranoid Involuntional, constitute the case material.

PROCEDURE: After equating the four sub-groups for age, education, socio-economic range, present and pre-psychotic level of intellectual functioning, the Rorschach test was administered individually to each patient and the resulting data submitted both to quantitative (statistical) and qualitative analysis. Special attention was given to content analysis because of the important role which sexual preoccupations play in the psychosis.

RESULTS: Final results cannot be reported at this time as the study is still in progress but the close relation frequently hypothesized between the paranoid involuntional and the paranoid schizophrenic seems to be substantiated as well as the occurrence in all involuntional syndromes of a number of organic factors. While there is thus some overlapping of signs, the two patterns which have emerged are sufficiently clear-cut not only to distinguish the involuntional psychoses from schizophrenia and from organic brain disease but also to differentiate between the paranoid involuntional process and involuntional melancholia proper. The data obtained also throws considerable light on the pre-psychotic personality make-up of women who succumb to these mental disorders at the climacteric. The differences in pattern between white and colored appear to be a function of cultural factors rather than of any essential modification of the psychosis.

CONCLUSION: Rorschach patterns characteristic of the Involuntional psychoses, hitherto undefined, have been established as an aid to differential diagnosis and to a better understanding of the process.

2:40 PM Further study of suicidal configurations in Rorschach records. *Marguerite R. Hertz, Western Reserve University.*

PROBLEM: In a previous study, ten configurations in terms of Rorschach patterns were identified as reliably distinguishing suicidal patients from non-suicidal patients and from normal adults. These included neurotic structure, deep anxiety, depressed states, constriction, active conflict and deep struggle, ideational symptomatology, agitation phenomena, resignation trends, sudden and/or inappropriate emotional reaction, and withdrawal and deficiency in emotional rapport with the world. It was established that a combination of five or more of these configurations in a record was ominous of suicidal inclinations.

In order to verify these findings, a further study was made of new records analyzed "blindly", i.e. without previous knowledge of case history, or of the specific nature of any problems if they existed.

POPULATION: These consisted of one hundred records from normal and abnormal subjects to whom the Rorschach had been given by the writer and thirty-eight records which had been submitted by other Rorschach examiners.

PROCEDURE: Analysis was made of the extent of agreement between Rorschach blind findings and case histories, psychiatric reports, and subsequent histories in terms of suicidal trends. Summaries were made of the frequency and distribution of the configurations in the normal and abnormal subjects studied.

RESULTS: The analysis shows a high percentage of agreement between Rorschach records considered suicidal and case histories which reveal suicidal inclinations in the

form of serious threats, actual attempts and/or actual suicides.

CONCLUSIONS: Because of the high degree of accuracy in detecting suicidal trends the ten configurations may be considered good and valid prognostic signs, and may be put to practical application by competent Rorschach examiners. (Slides)

3:00 PM Constriction as rated on three productions.

Frances Merchant Carp, Stanford University.

PROBLEM: (1) Is there agreement between clinical psychologists' ratings for constriction of children's Rorschachs, play constructions, and crayon drawings? (2) What is the relationship between constriction ratings on the Rorschach, play construction and drawings of the same child?

PROCEDURE: From each of 96 children, an entire third grade of a small town-rural school, was obtained a Rorschach, the photograph of a play construction, and three crayon drawings.

Using a seven-point scale and working independently, two workers rated each set of material for constriction.

RESULTS: Tetrachoric correlation coefficients indicate close agreement between the two workers' ratings of each set of material, but chance relationships between constriction ratings for the same child's various productions.

CONCLUSIONS: Raters can agree well on constriction in Rorschach protocols, or play constructions or crayon drawings, but these judgments may tell nothing about constriction in other productions of the same children. The child whose Rorschach is rated extremely constricted is no more likely than any other child to have his play construction or any of his drawings judged similarly. Clinicians can agree, but what they agree about is far from clear. Unless we are willing to say that constriction is constantly redistributed at random in this group of children, the various sets of concordant ratings are not reflective of the same personality factor.

The results (1) call into question the indiscriminate use of such productions as projective material revelatory of relatively stable personality characteristics and (2) suggest the need for experimentally rather than rationally and observationally derived signs of constriction, in each of the expressive modalities. They propose that, at the present stage of development of the techniques used, personality evaluation may be determined too largely by choice of tool.

3:20 PM Projective interpretation of the Stanford-Binet in a clinical training program. *Gladys Lowe Anderson, Michigan State College.*

The qualitative interpretation of psychological examinations, including tests of general intelligence, is not new. Wechsler and Rapaport have made distinctive contributions in this direction. The host of experimenters with projective techniques have posed problems which psychological examiners cannot ignore.

The traditional objectives in training students to administer and interpret the Stanford-Binet have been essentially two: 1) to make the student thoroughly familiar with the standardized procedure for administering and scoring the test; and 2) to give practice to the student in being at ease in the person-to-person test situation.

The Stanford-Binet has traditionally (historically) yielded a mental age and an intelligence quotient. Scant qualitative interpretation has traditionally been offered beyond a description of the child's behavior, a rating of the child's attitudes during the test, and the expression of the examiner's judgment as to whether the results did or did not indicate the child's best performance.

A third training objective is possible: to utilize the potentialities of certain sub-tests of the Stanford-Binet for revealing not merely the child's mental capacities but the dynamic relationships between the child and the world in which he lives. With this objective in mind certain subtests are found to be especially productive of responses that permit projective interpretation.

The use of the Stanford-Binet as a projective device will be discussed and illustrative examples of children's responses obtained from students' training tests will be given. (Slides)

3:40 PM A study of the relationship between a projective and a questionnaire type of personality test in clinical diagnosis. *Samuel Granick, Washington University.* (Abstract exceeded 300-word limit)

4:00 PM The use of the H-T-P in personality analysis. *John N. Buck, Lynchburg State Colony.*

PROBLEM: To demonstrate the value to the clinician of the use of the H-T-P (a two-phased—non-verbal and verbal—approach to the analysis of personality) in the examination of adults.

POPULATION: Four adult subjects with personality maladjustment of different types and of different degrees of magnitude.

PROCEDURE: After a short description of the H-T-P technique and its theoretical foundations, each case is presented as follows: (1) by giving a very brief historical sketch of the subject; (2) by showing the subject's drawings and by analyzing and discussing them and the subject's comments (spontaneous and induced) and associations concerning them.

CONCLUSION: The freehand, pencil drawings of House, Tree, and Person can provide the clinician with data concerning the integration, sensitivity, degree of maturity, and level of function of a subject's personality that might otherwise be obtained only after prolonged and intensive interrogation and examination. (Slides)

4:20 PM An experimental analysis of the influence of color on the protocol of the Rorschach test. *Rich-*

ard S. Lazarus, *University of Pittsburgh*. (Abstract exceeded 300-word limit)

INVITED ADDRESS

4:40 PM, Wednesday, Assembly Room

Frederick L. Wells: Clinical Psychology in Prospect and Retrospect

PSYCHOTHERAPY

8:50 AM, Thursday, Ballroom

Volunteered papers selected by the division

R. NEVITT SANFORD and MARGARET

BRENNMAN, Chairmen

8:50 AM An experimental study of the learning of client centered counseling in a six weeks training course. *D. D. Blocksma, University of Chicago*.

PROBLEM: This study reports the extent to which counseling techniques can be reliably identified and scaled on a client-centered to counselor-centered continuum, and the degree of learning of a client-centered approach in a brief training course.

POPULATION: The subjects were Veterans Administration Personal Counselors enrolled in a course given by the University of Chicago Counseling Center in 1946-47.

PROCEDURE: To secure an operational yet comparable measure of counseling procedures, the experimenter played the role of a client and recorded the thirty-seven subjects' counseling of one standard case before and two standard cases after training. The instruments are sensitive to degrees of training in client centered counseling. The training course is described.

RESULTS: Reliability checks show that judges can agree on the boundaries and identification of counseling techniques as defined in this study. High and low test scores (as obtained on tests given at the beginning and end of the training program) on directiveness and consistency of techniques are related to: instructor ratings, on-the-job supervisory ratings one year after training, clinical experience, average contacts per closed case on the job, and the subjects' rating of experiences valued during the six-weeks course.

CONCLUSIONS: Implications are given for training of counselors and for measuring the learning of counseling.

9:10 AM An analysis of the relationship between acceptance of and respect for self and acceptance of and respect for others in ten counseling cases.

Elizabeth T. Sheerer, Iowa State College.

PROBLEM: To investigate the relationship between acceptance of and respect for self and acceptance of and respect for other persons.

POPULATION: Ten counseling cases conducted at the University of Chicago Counseling Center totaling sixty electrically recorded interviews.

PROCEDURE: 1. The concepts to be studied were defined operationally with the aid of four judges. 2. Using the above definitions five judges rated on a five point scale 50 statements revealing some self evaluation and 50 statements revealing attitudes towards others, extracted from recorded client statements from seven cases. Step one of the scale represented a total absence of expressed acceptance and respect. Step five represented an expression of acceptance and respect with no expression of a lack of them. The average rating was computed for each item agreed on by a majority of judges. These items provided illustrations of the five scale points, for each of the two scales. 3. The reliability of the two scales used and the reliability of each judge's ratings were determined and found adequate for the purpose of this study. At least two out of three judges agreed over ninety percent of the time in applying both "self" and "others" scales. Each judge's mean rating for each interview as a whole was computed. There was only one instance in which a statistically significant difference occurred between the mean ratings of any two judges on a given interview. 4. The investigator and three other trained judges together rated ten recorded counseling cases on both scales.

RESULTS AND CONCLUSIONS: A positive correlation exists between acceptance and respect for self and for others. A regular increase in acceptance and respect both for self and others was obtained for the more successful cases, with the increase being somewhat more regular in regard to the self than to others.

9:30 AM A study of the process of non-directive therapy. *J. Seeman, University of Chicago*.

PROBLEM: In 1943 Snyder completed an investigation of the nature of non-directive psychotherapy. The objective of the present study was to describe the course of non-directive therapy with clients counseled four to six years after those in the original study. The use of Snyder's instrument afforded a direct comparison between his findings and those of the present study, making it possible to observe again the process of therapy and to analyze the development of non-directive counseling methods with the passage of time.

POPULATION: The study was based upon an analysis of ten cases, comprising sixty interviews, electrically recorded at the University of Chicago Counseling Center between the years 1945 and 1947.

PROCEDURE: Four investigators, Gerard Haigh, Alice Jonietz, Esselyn Rudikoff and the author, applied the instrument independently to different cases. In order to determine the reliability of judgments each of four interviews selected from the cases at random was classified independently by three judges.

RESULTS AND CONCLUSIONS: Some of the findings are as follows:

1. *Reliability*—Weighted percentage of inter-judge agreement on identification of each unit was 83.3%.

2. *Counselor response categories*—85% of all responses were in the non-directive categories. Significant differences were observed in frequency of use of counselor response categories from case to case.

3. *Comparison of Snyder's study with present study*—Significant differences between Snyder's cases and cases in the present study were observed with respect to frequency of use of the response categories. Present study indicates more frequent use of non-directive categories (85% in present study, 63% in Snyder's study). Lead-taking, semi-directive, and directive responses were less frequent in present study (5.4% in present study, 29.7% in Snyder's study).

9:50 AM Changes in self perception as related to changes in perception of one's environment. *Ted Aidman, Chicago, Illinois.*

PROBLEM: To investigate the extent to which the changed feeling tones expressed by a successful non-directively counseled client towards herself are related to the changed feeling tones she expresses towards other persons or issues—her external reality—as she moves through psychotherapy.

POPULATION: One highly successful non-directively counseled case. All but the first of sixteen interviews were electrically recorded. The data are 1,258 classified feeling units.

PROCEDURE: Instrument—An instrument was developed containing five gross feeling qualities on the horizontal plane, each of which are subsequently subdivided into positive, ambivalent, and negative degrees. The feelings are (1) accept-reject (2) secure-threat (3) independent-dependent (4) worthy-unworthy and (5) happy-unhappy.

On the longitudinal plane of the instrument are arranged the four gross area referents and their specific components. The gross referents are (1) Concept of Self (2) Family and Kin (3) Interpersonal Relations (4) Issues and Abstractions.

Reliability procedure—Four judges were trained to determine the reliability of the study.

Analysis procedure—The statistical results of the study were analyzed by the techniques of (1) simple percentages (2) Chi Square and (3) Rank Order Correlation.

RESULTS: Reliability—There was 90% agreement among four judges on gross feelings and referent comparisons. A unit by unit comparison revealed slightly below 70% agreement.

Analysis—Each of the three statistical techniques used were corroborative in demonstrating that the gestalt of the process is consistent. That is, the feelings towards the Self and Non-Self were in almost parallel relationship when analyzed by quartiles—and were highly consistent on an interview by interview basis.

CONCLUSIONS: Feeling tone quality changes and referent area changes occur in a describable sequence. (Sequence changes will be described in paper.) The qualities of feelings held towards other persons and issues are similar to those we hold towards ourselves.

10:10 AM The personality of the psychotherapist. *Frederick Wyatt, McLean Hospital.*

Assuming that specific qualities are needed for the successful practice of psychotherapy, a definition of such qualities can either be derived from pragmatic "clinical" observation, or from systematic study. Systematic studies of assessment as they are in progress in several places must be based on the study of the personalities of successful therapists or on an analysis of the therapeutic situation itself—most profitably on both. Analysis of the therapeutic situation, through the study of actual therapeutic experience, would aim to establish a scheme of the major demands and stresses implied in the therapeutic situation. It can be assumed, furthermore, that there is not only one but several personality constellations fit for doing psychotherapy adequately.

In this paper an attempt will be made to derive traits specific for therapy from an analysis of the therapeutic situation. Traits more specific than the several prerequisites usually mentioned (such as maturity, intelligence, empathy, etc.) apparently will be determined (a) by the stresses which the therapist will have to sustain and (b) by forms of apperception and reasoning peculiar to the therapeutic task. Among the former are the emotional demands of the patient in the transference situation, and the threat which the disclosure of motivation in therapy holds for certain fundamental beliefs which the therapist has in common with any other member of his culture. Among the latter are the ability to establish closures readily on various levels of experience, the ability to shift set quickly, and specific forms of imagination and of memory. These traits will be discussed in relationship to the dynamics by which they are determined in the development of personality.

10:30 AM Implications for therapy of personality changes resulting from a course in mental hygiene. *William U. Snyder and Barbara June Snyder, Pennsylvania State College.*

PURPOSES: (1) to measure changes in personal adjustment relating to the giving of information about maladjustment in a mental hygiene course, and (2) to measure the difference in personal adjustment between a group of mental hygiene and general psychology students.

METHOD: Minnesota Multiphasic Personality Inventories were administered at the beginning and end of the semester to 40 students in a course in mental hygiene and to 67 students in general psychology. Subjects' motivation was high; their knowledge of the experimental purpose was controlled.

California Personality Tests and Bell Adjustment Inventories were administered at the beginning and end of the semester to a different group of 24 mental hygiene students taught by the same instructor as the first group, and to 50 general psychology students. In addition, subjective attitudes toward the course were recorded.

Comparisons of the pre- and post-test scores and of the experimental and control group scores, and of the scores of a special matched control group were made, using the standard error of the difference between means. The scores of the 10 persons in the first mental hygiene class who had received individual psychotherapy were treated as a special experimental group and compared with the other experimental and control groups.

RESULTS: In no case did any of the control groups show significant changes between pre- and post-test scores. However, on the Bell Adjustment Inventory the experimental group approached a significant improvement in score on the retest. There were very significant differences in student opinion regarding personality changes resulting from the course. Also there were some significant differences between experimental and control groups on test scores. These differences are discussed and conclusions and inferences relating to group information-giving and psychotherapy are made.

10:50 AM An investigation of the effects of individual and group play therapy on the reading level of retarded readers. *Robert E. Bills, Georgetown, Kentucky.* (Abstract exceeded 300-word limit)

SYMPOSIUM AND ROUND TABLES: IMPLICATIONS OF CURRENT RESEARCH IN PSYCHOTHERAPY

1:40 PM, Thursday, Auditorium, Sleeper Hall, Boston University, 688 Boylston Street (four blocks from Hotel Staller)

CARL R. ROGERS, Chairman

Participants: Individual discussion groups to be formed at the psychotherapy symposium

SYMPOSIUM: CLINICAL PRACTICE AND PERSONALITY THEORY

8:50 AM, Friday, Ballroom

SAUL ROSENZWEIG, Chairman

Jointly organized with the Division of Personality and Social Psychology

Participants: D. W. MacKinnon, A. W. Combs, G. S. Klein

DIVISION OF CONSULTING PSYCHOLOGY

BUSINESS MEETING

11:10 AM, Tuesday, Parlor D

SYMPOSIUM: HUMAN RELATIONS AND ORGANIZATION

2:50 PM, Tuesday, Ballroom

Jointly organized with the Division of Industrial and Business Psychology

DONALD E. SUPER, Chairman

A. Panel: Marion Bills, Jack Dunlap, Chester Evans, E. Lowell Kelly, John W. Macmillan, Jay L. Otis, Alfred J. Marrow, Robert B. Selover

Nathan Maccoby: A comparison of behavior and attitudes of supervisors of comparable work groups differing in productivity

Nancy Morse: An analysis of types of work satisfactions and the conditions to which they are related

B. Panel: Marion Bills, Jack Dunlap, Chester Evans, E. Lowell Kelly, John W. Macmillan, Jay L. Otis, Alfred J. Marrow, Robert B. Selover

SOCIAL HOUR

5:00 PM, Tuesday, Georgian Room

Arranged for members of the Division of Clinical and Abnormal Psychology, the Division of Industrial and Business Psychology, and their friends by the Division of Consulting Psychology

Hosts and Hostesses: Mr. and Mrs. F. Lyman Wells, Miss Louise Wood, Mr. and Mrs. Robert A. Young.

SYMPOSIUM: PROBLEMS OF THE CONSULTANT IN CLINICAL PSYCHOLOGY

8:50 AM, Wednesday, Assembly Room

GEORGE A. KELLY, Chairman

Participants: Frances S. Alexander, Charles N. Cofer, E. Lowell Kelly, Bertha M. Luckey, Edward I. Strongin, Robert A. Young.

This symposium will be devoted to problems of the consultant in private practice. The discussants represent different geographical areas and different points of view. They include psychologists engaged largely in private practice and others concerned with training and allied responsibilities. (Session limited to members, including applicants for membership, in the Consulting Division.)

DIVISION OF INDUSTRIAL AND BUSINESS PSYCHOLOGY

SYMPOSIUM: HUMAN RELATIONS AND ORGANIZATION

2:50 PM, Tuesday, Ballroom

Jointly organized with the Division of
Consulting Psychology

DONALD E. SUPER, Chairman

Rensis Likert and Daniel Katz: A long-range program for study of group motivation, group morale, and group performance.

Nathan Maccoby: A comparison of behavior and attitudes of supervisors of comparable work groups differing in productivity.

Nancy Morse: An analysis of work satisfactions and the conditions to which they are related.

Panel: Marion Bills, Jack Dunlap, Chester Evans, E. Lowell Kelly, John W. Macmillan, Jay L. Otis, Alfred J. Marrow, and Robert B. Selover

SOCIAL HOUR

5:00 PM, Tuesday, Georgian Room

Arranged for members of the Division of Clinical and Abnormal Psychology, the Division of Industrial and Business Psychology, and their friends by the Division of Consulting Psychology.

Hosts and Hostesses: Mr. and Mrs. F. Lyman Wells, Miss Louise Wood, and Mr. and Mrs. Robert A. Young.

ANALYSIS OF PERSONAL FACTORS IN INDUSTRY

11:10 AM, Wednesday, Assembly Room

Volunteered papers selected by the division

ROGER M. BELLOWES, Chairman

11:10 AM A clinical approach to the everyday problems of the normal supervisor and key man in industry.
J. Elliott Janney, Rohrer, Hibler and Replogle.

PROBLEM: (1) To define and describe some of the principal human problems (as distinguished from technical problems) which tend to concern most supervisors and key men in industry. (2) To define and describe some of the contributions being made by some clinical psychologists to the solution of such problems.

POPULATION: Key men and supervisors of 178 corporations which have been studied for from one to twenty-one years each.

PROCEDURE: (1) Several families of persistent human problems tend to occur in all organizations studied and are the concern of this paper. (2) A clinical approach based upon, and oriented in terms of, the commonly accepted principles and facts of general psychology has

been developed. (3) Diagnosis-therapy has been developed as a continuum and is mutually participated in by both psychologist and client.

RESULTS: Analyses of case studies indicate that as the supervisor, or key man, in industry ascends the ladder of responsibility his preoccupation with human problems increases as his concern over technical problems decreases.

CONCLUSIONS: The everyday problems of normal supervisors and key people in industry are largely human problems. These human problems are of such a nature as to make the clinical approach to industrial consultation a fruitful one.

11:25 AM Employees' problems as related to interest in an educational program in industry. *Frank Costin, University of Chicago.*

PROBLEM: What are some of the factors motivating employees to take part in an educational program sponsored by industry? A large manufacturing concern has set up in its plants an "off-hours" educational program. The purpose of this study is to explore the relationships that exist between the employees' participation in this program and their (1) personal problems, (2) academic interests, (3) vocabulary levels, and (4) specific biographical factors.

POPULATION: 725 employees representing the following occupational classifications: (1) professional, managerial, technical; (2) clerical, (3) skilled and semi-skilled manual workers, and (4) unskilled manual workers.

PROCEDURE: An anonymous questionnaire was administered to the employees, under group test conditions. The questionnaire was constructed to elicit responses in five major sections. These sections are as follows: (1) Personal problems. To discover these a problem check-list of 200 items was used. The check-list covers nine "problem areas," including "job adjustment." (2) Expression of interest in the educational program on a five-point scale. (3) Biographical data on eight factors. (4) Academic interests. A check-list of 100 items was used. (5) Vocabulary levels. A fifty item vocabulary test was employed.

RESULTS: Three groups of employees are now being compared: Group A—Participated in the educational program; Group B—Expressed interest in the program but have never participated; Group C—Expressed non-interest in the program and have never participated.

Groups B and C are random samples. All three groups are being compared as to (1) expressed problems, (2) specific biographical factors, (3) academic interests, and (4) vocabulary levels. The complete results and conclusions of this study will be ready for presentation not later than August 1. They will emphasize implica-

tions for both a theory of motivation and a basis for developing an educational program in industry.

This research is being carried out as a project for the Department of Education, University of Chicago.

11:40 AM The analysis of personal documents as an experimental approach to the study of employee attitudes. *Chester E. Evans, General Motors Corporation and Wayne University.*

PROBLEM: To study the entries received from employees in a contest on the subject, "My Job and Why I Like It", in an effort to determine whether employee attitudes are reflected therein. To develop the necessary research techniques for a valid analysis.

POPULATION: Materials pertinent to the contest were submitted to 297,401 eligible employees in 49 cities throughout the United States. Of those who were eligible, 174,854 employees from all localities entered the contest. For purposes of more easily checking the universe group, a ten per cent sample was identified as the entries were received, thereby providing absolute randomness.

PROCEDURE: Early stages of the quantitative analysis entailed a content analysis to produce themes against which the entries could be tabulated. Cross-tabulations of themes and thematic patterns against vital statistics of the respondents were made. To establish meaningful differentiation between operating units of the corporation, a modification of the chi-square technique was used. Significant differences were checked against known sources in sub-sample units to determine the validity and meaningfulness of statistical findings. To further reduce the mechanical problem of analysis, the original 79 themes were retabulated into 18 major theme groups.

RESULTS: Significant differences of thematic material are indicated among the operating units. Investigation and experimental testing of these differences within these operating units substantiate the findings suggesting the reliability of the methods used.

CONCLUSIONS: This form of attitude survey successfully meets several objections to conventional polling practices. This approach does not force responses from the participants nor give them the impression that they are being studied. The technique is essentially a projective one, for it gives the respondent an opportunity to develop a field of psychological meaningfulness relating to the broader aspects of job satisfaction and dissatisfaction. In general, office employees showed quantitative differences in the themes developed in their entries. (Slides)

11:55 AM The use of a goal and achievement index in the study of business executive relationships. *C. G. Browne, The Ohio State University.*

PROBLEM: To study the opinions of industrial executives toward possible goals of the business and the degree to which these goals have been achieved.

POPULATION: Twenty-three top executives in a tire manufacturing concern.

PROCEDURE: By personal interview, executives gave a list of company goals and indicated how well each goal had been achieved. Each executive rated seventeen statements chosen from the total list on a five-point scale in terms of their importance as company goals and the degree of achievement attained with each one.

RESULTS: All of the executives, except one, believed that the company's achievements did not equal the importance of its goals, the ratio of goal score to achievement score varying from .480 to 1.000. Individual deviations from the president's "G-A" score as a criterion ranged from minus seven to plus twenty-one. Grouped by departments, finance rated company achievements lowest, followed by personnel, production, sales, and general administration.

Correlations between goal and achievement ratings by departments varied from .17 for sales to .66 for general administration. Correlations between department ratings and the combined ratings of the three top executives ranged from .54 to .88 for goals and from .60 to .87 for achievement.

All departmental groups rated achievement in personnel items highest in relation to their importance. Beyond this, there was a tendency for each department to consider that the greatest relative achievement had been in its own area.

CONCLUSIONS: Both between individuals and between groups of individuals in business departments, there are differences in attitudes toward company goals and achievement which may be indicative of psychological and personal relationships and attitudes within the business. The technique offers possibilities for further study as a measure of industrial leadership and communication between senior and junior executives.

BANQUET

6:00 PM, Wednesday, Salle Moderne

Presidential Address: George K. Bennett: A New Era in Industrial and Business Psychology

Business meeting following

THE CRITERION

8:50 AM, Thursday, Parlor A

Volunteered papers selected by the division

EDWIN E. GHISELLI, Chairman

8:50 AM What raters rate. *Erwin K. Taylor, Personnel Research Section, AGO.*

PROBLEM: To determine if quantification of a small number of variables from a complete service record of an officer's past performance could duplicate rankings

produced by exhaustive examination of the entire service record.

POPULATION: Two hundred permanent Lt. Colonels in the regular army selected at random from nine Branches of the Army.

PROCEDURE: (1) The population (for each branch) was randomly divided into two independent samples. (2) The complete military record of each officer was independently evaluated by eight senior officers in the headquarters of his Branch. (3) Forty-one variables on the record were quantified and these and the average rankings intercorrelated. (4) Several batteries of predictors were developed.

RESULTS: (1) Multiple correlations between batteries of from 4 to 6 variables and the "criterion" rankings were of the magnitude .90. (2) Cross validation reduced these to the order of .85. (3) The average correlations between pairs of raters (28 pairs) ranged from .68 to .92 for the twenty samples.

CONCLUSIONS: (1) Rankings based on an examination of service records tend to show higher reliabilities than those usually obtained by other rating procedures. (2) A small number of statistically selected variables can predict the average rank of an individual as well as or better than the evaluation by one rater can predict that of another rater.

Laverne Burke collaborated in this experiment.

9:05 AM The value of acquaintance ratings in criterion research. *Leonard W. Ferguson, Metropolitan Life Insurance Company.*

PROBLEM: The purpose of the research herein described is to determine the effect of variation in degree of acquaintance between rater and ratee upon the validity of a method of appraising employee performance. In the Metropolitan Life Insurance Company, district office managers periodically appraise assistant managers on one of two 52 multiple-choice item appraisal forms which are validated from time to time against various ratings furnished by traveling field representatives. The problem is to determine the effect of variation in the degree to which field representatives are acquainted with each assistant manager, upon the calculated validity of the appraisal.

POPULATION: The basic populations are 1500 assistant managers, 800 managers and 100 traveling field representatives.

PROCEDURE: Whenever criterion (i.e., numerical and paired comparisons) ratings are secured, each field representative states whether he is (a) extremely well, (b) moderately, or (c) only slightly acquainted with each assistant manager rated. Upon the basis of these ratings (and in accord with Likert's sigma scoring technique) an acquaintance index is derived, and assistant managers are classified into various groups in accord therewith. For

each of the resulting groups the validity of the appraisal is independently determined.

RESULTS: The correlation between degree of acquaintance and criterion ratings ranges between .02 and .59; the calculated validity of the appraisal varies directly (from .42 to .69) in accord with degree of acquaintance; and in eleven sample groups studied, the lower the relationship between degree of acquaintance and criterion, the greater the calculated validity of the appraisal (ρ , —.42).

CONCLUSION: The use of subjective ratings as a criterion necessitates the use of some method of eliminating or partialling out the effect of variation in degree of acquaintance between rater and ratee if the unattenuated validity of the appraisal is to be accurately determined.

9:20 AM Criterion reliability in the selection of recruiting personnel. *Donald E. Baier, Personnel Research Section, AGO.*

PROBLEM: To determine whether the apparent failure of predictors for selecting Army Recruiting Personnel was a consequence of unreliable criterion.

POPULATION: All Army and Air Force enlisted men on recruiting duty east of the Mississippi River, Spring 1946, who could be secured for testing ($N = 1075$).

PROCEDURE: a. Kuder Preference Record; a collection of multiple choice self-description items developed by the Personnel Research Section or constructed for the purpose; and a summary sheet giving personal military history data were administered in the initial study. The criterion was the number of recruitments per unit of time. Predictor data were collected only on the upper and lower third of the population. In a follow-up study, information was obtained as to which of the subjects were still on recruiting duty after a year had elapsed.

(b) In the first study scoring keys were developed by item analysis against the production criterion. The validities of these keys were then determined by rescoring in a cross-validation population. In the follow-up study biserial validities of the scoring keys already developed were determined against the criterion of retention on recruiting duty.

RESULTS: Estimated product-moment validities of the scoring keys in the first study were all low, ranging between .09 and .17. Suspected unreliability of the production criterion together with the information that opportunity to receive credit for enlistments varied greatly suggested that the disappointing results derived from the fallibility of the criterion. In the follow-up study an optimal combination of the initial scoring keys gave a biserial validity of .36.

CONCLUSIONS: The hypothesis that the low validities of the initial study were due to unreliability of the criterion rather than to the inadequacy of the predictors appears tenable. The follow-up study demonstrated that the

instruments developed have reasonably adequate validity as predictors of retention on recruiting duty.

9:35 AM Use of an independent measure in billet evaluation. *T. C. Karlowski and C. P. Sparks, Richardson, Bellows, Henry and Co.*

PROBLEM: To improve the accuracy of a billet (job) evaluation by supporting a Point System with an independent measure of billet level.

POPULATION: 112 billets (jobs) at the Naval Air Training Station, Pensacola, Florida. Coverage in rank is from enlisted personnel to Captain working in areas of operation, maintenance, administration, supervision, and instruction.

PROCEDURE: The 112 billets were split into eight stratified groups (means and standard deviations assumed equal) of 14 billets each. These groups in turn were systematically paired so that 28 groups of 28 billets resulted. Each of twenty-eight Navy judges selected to represent all apparent biases rated a group. This meant that each billet was compared with all others at least once, and seven rankings for each billet were provided. Mean and median rankings for each billet were then computed and converted into Standard Scores for comparison with Standard Scores obtained through the Point System. (The Point System employed the following factors: Education, Experience, Supervision Received, Supervision Exercised, Responsibility for Gear and Equipment, and Contacts).

RESULTS: The correlation between the Point Procedure and the independent measure was 0.88. Follow-up revealed reasons for discrepancies and allowed more accurate and equitable level assignment. Uncorrected split 3-4 reliability of ratings was 0.91. Correlation between mean and median rankings of each billet was 0.98.

CONCLUSIONS: A. The described rating procedure can be used to provide an independent check of a Point System of billet evaluation and thus result in a more accurate assignment of billet level.

B. By splitting a large group of billets into small stratified groups, a series of ratings of sufficient reliability can be obtained in a relatively short time.

C. Recommendations for reorganization and restructuring of billets based on a billet evaluation which includes ratings by local judges may be more easily supported.

TEST EFFICIENCY

11:10 AM, Thursday, Parlor A

Volunteered papers selected by the division

EDWIN R. HENRY, Chairman

11:10 AM A comparative study of the predictive efficiency of batteries of tests selected by the Wherry-

Doolittle and a multiple-cutting score method.

Floyd L. Ruch, University of Southern California.

PROBLEM: To compare the two methods named in the title as to predictive efficiency at different levels of selectivity and in different selection situations.

The operations involved in the Multiple-Cutting-Score method of test selection will be briefly described. This procedure differs from the Wherry-Doolittle method in: (1) requiring lower skill of clerical labor used in establishing selection standards; (2) requiring fewer hours of labor to establish standards; (3) requiring less time to apply standards to the new applicant; (4) not assuming rectilinearity of regression of test scores on the criterion; (5) in assuming that a high score on one test will not compensate for a low score on another test in the battery. It resembles the Wherry-Doolittle method in that it selects on the basis of predictive efficiency a group of tests to be included in a final battery.

Since this method was briefly described by its author in 1943 it has been employed in comparison with the Doolittle or Wherry-Doolittle method on the following groups of subjects: (1) 128 power-sewing machine operators, using 8 tests; (2) 165 detail-draftsmen trainees, using 11 tests; (In collaboration with Glen Grimsley) (3) 820 steam-winch-operator trainees in the United States Navy, broken down into a variety of subgroups and using a total of 16 different tests. (In collaboration with Jean Wahoske). (4) 500 students of accounting using 7 tests. (In collaboration with Glen Grimsley.)

PROCEDURE: The measure of efficiency of the battery selected by each method was the degree to which the criterion scores of the subjects selected by one method excelled those of an equal proportion of subjects selected by the other.

RESULTS: All studies completed thus far support the general conclusion that the Multiple-Cutting-Score method as compared with the Wherry-Doolittle method yields test batteries which are slightly more predictive of the criterion when the selection-rejection ratio is in the neighborhood of 10%. With less extreme selectivity, the superiority of the Multiple-Cutting-Score method is not apparent.

11:25 AM The development and validation of a battery of tests for the selection of clerical workers. *Robert B. Selover, Prudential Insurance Company.*

PROBLEM: The purpose of this study was to determine what abilities are important for the selection of workers engaged in a typical clerical job in an insurance company.

POPULATION: The experimental group consisted of 193 clerks. These employees were divided among 5 divisions, each division with 2 sections. Cross-validation was carried out on 85 employees subsequently assigned to the job.

PROCEDURE: The following battery of tests was administered to the experimental group: Vocabulary,

Arithmetic Reasoning, Calculation, Speed of Reading, Memory, Letter-Digit Substitution, Name Checking, Number Checking, Dotting, Tapping, and Posting. Three supervisors for each section independently rated employees on the following factors: accuracy, memory, production, and over-all value to the section. In addition the supervisors ranked the employees in order of their over-all value to the unit. The ratings of the three supervisors were combined and used as the criteria. The interrelationships among test scores, experience and ratings were computed and factored by the centroid method.

RESULTS: The Wherry test selection method was used to determine the most valuable tests. A multiple correlation of .41 was obtained by a combination of 4 tests. Five factors were tentatively identified after an orthogonal rotation of the factor loadings. The abilities most important on this job appear to be number facility and perceptual speed. The tests were used to select employees for assignment which resulted in decreased variability. Nevertheless, cross-validation yielded a correlation of .33 with supervisors' ratings. Effectiveness of the selection method is shown by comparing the average ability of clerks in 2 divisions with a ratio of expected-to-actual operating expenses.

CONCLUSION: The selection procedure developed in this experiment is effective in improving operating effectiveness on the job.

11:40 AM The effectiveness of commonly employed occupational tests. *Edwin E. Ghiselli, University of California.*

PROBLEM: To summarize the validity coefficients of tests commonly used for the selection of workers in various occupations, the criteria being production or similar proficiency measures.

PROCEDURE: Published reports in the professional and trade literature relative to the validity of occupational tests were reviewed, and supplemented by unpublished findings obtained from various industrial and governmental organizations, and from personal investigations. To facilitate comparisons, tests and occupations were classified into major types. Where the data were sufficient, representative validity coefficients for each type of test for each occupational group were determined.

RESULTS AND CONCLUSIONS: For clerical workers best results are given by intelligence (.40), name comparison (.35), and arithmetic (.35) tests, and fair predictions by number comparison (.25), immediate memory (.30), and substitution (.30) tests. Cancellation (.15), spatial relations (.10), location (.05), path tracing (.10), pursuit (.10), tapping (.15), arm dexterity (.20), hand dexterity (.15), finger dexterity (.20), and personality (.20) tests are borderline or inadequate. Personality measures (.40), give good results for salesmen, and intelligence (.30) and interest (.25) are fair. In the case of sales

clerks, tests of various abilities uniformly yield low and negative validity coefficients ($-.10$). Positive predictions are given by personality measures (.30). For supervisory personnel intelligence tests give good results (.50). For factory foremen intelligence (.40), spatial relations (.40), and mechanical principles (.45) tests are good. Personality measures are borderline (.20). Spatial relations (.45) and mechanical principles (.40), and intelligence (.35) tests give good predictions for skilled workers, and finger dexterity tests (.20) are borderline. Hand dexterity tests (.35) appear to be best for semiskilled workers, and fair predictions are obtained from cancellation (.30), spatial relations (.30), path tracing (.25), mechanical principles (.25), finger dexterity (.30), and personality (.30) tests. Borderline or inadequate results are given by intelligence (.20), arithmetic (.15), number comparison (.20), name comparison (.20), location (.20), pursuit (.20), tapping (.15), and arm dexterity (.15) tests.

11:55 AM The prediction of the performance time of a motor task from the performance times of its component parts. *Jerome S. Kornreich, Yale University.*

PROBLEM: The industrial technique of setting a time value on a job from tables of synthetic standard times requires the division of the job into its component motor elements and the summation of standard times for each of the elements. The use of this technique implies that there is no change in the performance times of the elements when they are performed separately and when they are performed in serial combination. The present experiment was designed to furnish evidence on two problems: (1) Is the performance time of a serial motor task greater than, equal to or less than the time that would be predicted from the sum of the separate performance times of its component units? (2) If there is a difference between the two times, is it a function of the number of units in the task?

PROCEDURE: Groups of Yale undergraduates were run on three different serial, motor tasks—one with identical units, one with similar units and one with dissimilar units. Performance times were computed for each of the units and for their successive combinations.

RESULTS: 1. The performance time of a serial motor task exceeds the time that would be predicted from the sum of the performance times of its component units.

2. The difference between the two times, expressed in absolute time values, is a positive function of the number of units in the task.

CONCLUSIONS: Although the experimental procedures used are not directly comparable to industrial jobs, the results obtained suggest that completely accurate use of synthetic standard time data will require the computation of percentage time allowances to cover the increase

in performance time caused by the combining of work elements. (Slides)

12:10 PM A study of faking on the Kuder Preference Record. *Orrin H. Cross, University of Alabama.*

PROBLEM: To determine whether or not a motivated person can fake an interest which he does not possess on the Kuder Preference Record.

POPULATION: 364 high school students from four of the five Birmingham, Alabama high schools, 181 males, 183 females.

PROCEDURE: About six hundred students of both sexes in four of the five Birmingham high schools were given the Kuder Preference Record as part of their guidance program. High scoring individuals on each of the nine scales were then asked to fake a low interest in that field and low scoring individuals were asked to simulate a high interest. None of the participants had been informed as to his honest score.

RESULTS: The subjects of both sexes succeeded in faking every one of the scales. Values of "t" between honest and fake scores by sex indicated probabilities of less than one in a hundred on all scales excepting one. On this scale, the persuasive, the "t" value for the females who attempted to fake a low score represented a probability between one and two in a hundred. When the "t"-value of this group is corrected by the elimination of two cases who increased their scores rather than decreased them this probability also falls below one in a hundred.

CONCLUSIONS: It may be concluded from these results that the use of the Kuder Preference Record can only be

justified where there is little incentive to mis-represent oneself, e.g., in a guidance situation. In a situation where one is motivated to wish to appear interested in a field of work, e.g. business or industry, the use of this inventory appears contraindicated.

A partial report of this study was given at the 1948 meetings of the Southern Society for Philosophy and Psychology.

SYMPOSIUM: NOVEL TESTING TECHNIQUES: THE INTERACTION CHRONOGRAPH

1:40 PM, Thursday, Assembly Room

GEORGE K. BENNETT, Chairman

Presentation of research findings: E. V. Chapple

Participants: Harold A. Edgerton, Marion W. Richardson, Carroll L. Shartle, Robert J. Wherry.

SYMPOSIUM: ETHICAL PRACTICES IN INDUSTRIAL PSYCHOLOGY

8:50 AM, Friday, Assembly Room

H. E. BURTT, Chairman

Participants: Orlo L. Crissey, Edward E. Cureton, Chester E. Evans, E. E. Ghiselli, D. H. Fryer, Arthur W. Kornhauser, William McGehee, Harold Seashore and Carroll L. Shartle

This meeting will be open only to members of the American Psychological Association.

DIVISION OF EDUCATIONAL PSYCHOLOGY

SPECIAL EDUCATIONAL PROBLEMS

8:50 AM, Tuesday, Georgian Room

Volunteered papers selected by the division

FRANCIS P. ROBINSON, Chairman

8:50 AM Hearing deficiency and scholastic achievement.

Frank W. Finger, University of Virginia.

PROBLEM: To determine the relationship between hearing deficiency and scholastic achievement score, with performance on a non-language test of general ability held constant.

POPULATION: Two groups of 28 children each, selected from a total tested population of 442 pupils of grades 4-7 in a county school system in Virginia.

PROCEDURE: On the basis of two group screening tests involving the Western Electric 4-A audiometer, and two individual pure tone checks (Maico D-5 pure tone audiometer), 28 pupils with average hearing loss over the speech range of more than 10 db. in the better ear were designated "hard-of-hearing." Each of these pupils was

paired with a normal-hearing pupil, with score on the non-language series of the Pintner General Ability Test, sex, age, and years in school equated. Scores of the two groups on the Stanford Achievement Battery were compared.

RESULT: The hard-of-hearing group scored an average of 3.53 points lower on the total achievement battery than did the matched normal-hearing group, with this difference significant at the 4% level of confidence. Differences on the sub-tests of paragraph meaning, language usage, and arithmetic reasoning were respectively 4.32 ($P = .06$), 5.00 ($P = .07$), and 5.90 ($P = .001$). In average IQ on the non-language test, the 28 hard-of-hearing pupils were not significantly different from their 414 normal-hearing classmates.

CONCLUSIONS: So far as can be generalized from the population sampled, there is no reason to believe that the intelligence of children with hearing defect is lower than that of normal-hearing pupils, if the comparison is made on the basis of a non-language test. However, the hard-of-hearing children are likely to progress academically at

a sub-normal rate, unless special consideration is given to their handicap.

Miss Julie W. Sprunt collected the data for this investigation. (Slides)

9:05 AM Teacher's problems with hard-of-hearing children. *Miriam Forster Fiedler, Vassar College.* (Abstract exceeded 300-word limit)

9:20 AM The prolonged pre-academic program at the Wayne County Training School: an evaluation after nine years. *Ruth M. Patterson, Edna A. Maisner, and Thorleif G. Hegge, Wayne County Training School.*

The prolonged pre-academic program at the Wayne County Training School has been described in many articles, most of which have appeared in the *American Journal of Mental Deficiency*. The program is designed to promote the acquisition of efficient work habits, reading readiness, manual and social skills, essential knowledge, and personal and social adjustment. It is "democratic" in nature, attempting to reduce frustration and develop initiative and a positive problem solving attitude. The positive values of the program are shown in a follow-up study of fifty-five boys (I.Q. 60-79 inclusive) to be reflected in a reduction of extreme problem behavior in the school and following parole to the community.

These boys entered the institution at an average C.A. of 9.0 years. Their academic instruction was now discontinued for approximately 2.5 years. Nevertheless they did as well as the comparison group with respect to final academic status and intelligence score.

9:35 AM The Air University program of reading training through improvement of visual processes. *Fred Couey, The Air University.*

PROBLEM: To develop techniques for improving the reading rate and comprehension of Air Force officers in the schools of The Air University, through practice in the visual processes.

POPULATION: 30 officers (pilot study); 115 officers (present study); projected population, 1948-49, 5000 officers. **PROCEDURE:** *Preliminary testing:* Records are obtained from the orthorater and the ophthalmograph. Standardized scores are obtained from the Iowa Silent Reading Examination; rough scores on speed from averages on four timed paragraphs. *Training:* Six weeks program, three hours per week, spaced throughout weekdays. Twenty officers are assigned in each period. They work half an hour on the tachistoscope, from 5-digit to 9-digit slides; from $\frac{1}{15}$ second to $\frac{1}{10}$ second on each type. They spend the other half hour at the Reading Rate Controller, progressing by approximately five per cent increments each practice period. Reading materials are unleaved fiction books from current lists, selected only for topic interest. Consultation interviews are scheduled for

officers whose progress is "abnormal," for assistance in structuring their reading. Daily performance records are kept by each individual; self-administered weekly proficiency tests are used (covering a chapter in a fiction book). *End Testing:* Iowa Silent Reading Examination, alternate form, is administered to each officer.

RESULTS: *Pilot study:* Voluntary (students, instructors)—from average speed of 272 words per minute (with minimum comprehension of 70% by proficiency test), to 530 (same comprehension criterion). *Present study:* Required (students only)—from average speed of 250 words per minute to approximately 600 (comprehension criterion as above).

CONCLUSIONS: 1. Mature adults can be trained in relatively short time, with relatively little supervision, to increase their reading efficiency on general reading material. 2. A program of required reading training is as effective as a voluntary program. 3. The tachistoscope and Reading Rate Controller are valid instruments for producing increased reading efficiency.

PRESIDENTIAL ADDRESS

5:00 PM, Tuesday, Assembly Room

Percival M. Symonds: Education and Psychotherapy

DINNER AND BUSINESS MEETING

6:00 PM, Tuesday, Parlor A

SYMPOSIUM: THE ANALYSIS OF THE RESULTS OF A SURVEY ON THE CONTRIBUTIONS OF PSYCHOLOGY TO EDUCATION

8:50 AM, Wednesday, Parlor B

HARRY N. RIVLIN, Chairman

Participants: Lee J. Cronbach, Arthur T. Jersild, Irving Lorge, Harold H. Abelson, Herbert A. Carroll, Arthur I. Gates, S. L. Pressey, O. Hobart Mowrer, Maurice E. Troyer, May V. Seagoe, and Goodwin Watson

PREDICTION AND EVALUATION PROBLEMS

2:50 PM, Thursday, Parlor B

Volunteered papers selected by the division

ASAHEL D. WOODRUFF, Chairman

2:50 PM The definition of intelligence as ability to learn. *J. W. Tilton, Yale University.*

PROBLEM: Very low correlations between intelligence and learning have been offered as a challenge to those who define intelligence as ability to learn. This paper is an examination of the validity of the challenge.

PROCEDURE: 1. An answer is proposed to the question: Under what conditions may measures of learning be considered valid measures of ability to learn?

2. The position is taken (a) that these conditions are seldom met and (b) that, except as they are met, low correlations do not invalidate the definition in question.

3. Data are presented from two situations chosen to yield measures of learning ability of better than average validity. In both cases the learning was school learning in the social studies area. The learners were, in one case, a sample of 134 pupils from a large seventh grade in a single junior high school, and, in the other, all of the seniors ($N = 156$) in a senior high school.

4. The measures of learning are examined for validity and are correlated with intelligence test scores, and with the before and after-learning social studies test scores.

5. After-learning scores are evaluated as measures of learning ability.

RESULTS: The correlations between the measures of learning ability and intelligence test scores were as high as one could reasonably demand for a validation of the definition of intelligence as ability to learn, but the final score correlations were still higher.

CONCLUSIONS: So far as the limited study goes, it validates the questioned definition, finds no inconsistency between it and the many low positive and some negative correlations which have been reported, and offers the achievement test score obtained after a common period of motivation as the best measure of ability to learn in the given area.

3:05 PM Survey of army educational programs. *Wilton P. Chase, Personnel Research Section, AGO.*

PROBLEM: To compare psycho-educational problems in Army schools with those faced in civilian schools.

PROCEDURE: The Army employs technical experts in the fields of education and educational psychology to assist its own personnel research specialists in conducting surveys of educational programs in Army schools. These surveys are conducted much on the same basis as are similar surveys of civilian schools.

RESULTS: To date three Army schools have been surveyed. The evidence indicates that Army schools face common problems and have similar needs in developing appropriate and effective programs of instruction. The psycho-educational problems are more subject to control than are the same problems existing in civilian schools. However, their control within the Army is often more difficult in comparison with civilian schools because of differences in such things as: qualifications of instructors; training in instructional methods; school plants; source of training doctrine; methods of evaluation; limits upon tours of duty for instructors; supervision policies; length of school day; length of courses; availability of instructional aids; and, motivation of students.

CONCLUSIONS: Army education to date has been concerned primarily with training procedures without particular regard for their relation to the nature of the learning required to qualify personnel to undertake

various duties. There is a growing recognition of the need for approaching Army educational programs from a psycho-educational viewpoint which will result ultimately in modifying training procedures in order to solve what is essentially a personnel psychology problem, namely, to modify behavior through training in order that a soldier becomes qualified for assignments for which he is not qualified without appropriate training.

3:20 PM Prediction of student success in an engineering college. *Vernon Jones, Clark University.*

PROBLEM: The purpose of this investigation has been to determine the degree to which certain aptitude and achievement tests and secondary school marks will, individually and in teams, predict scholastic success at different levels of advancement in an engineering college. POPULATION: The study is based upon a follow-up of over 500 students entering an engineering college during a four-year period.

PROCEDURE: The entire entering class for each of four years was tested by the experimenter two or three days before the beginning of the academic year. The different tests employed with one or more classes were as follows: Cooperative Mathematics Test, Cooperative Physics, Cooperative Chemistry, Yale Spatial Visualization, Iowa Physical Science Aptitude, Otis Quick Scoring Mental Ability, Cooperative Reading, and the Carnegie Pre-Engineering Inventory. The secondary school marks of all students were analyzed and a correction applied to increase their comparability from school to school.

In analyzing and synthesizing the data multiple correlation and regression techniques were employed. The final results are based on 27 multiple R's and the accompanying regression equations.

RESULTS: The most efficient team discovered in this study for forecasting first semester and first year marks consisted of the mathematics test, the physics or chemistry test, and secondary school marks. The R between the criterion and this team was found to be .64 and .63 respectively in the two classes in which it was tried. The tests alone, involving a net testing time of 55 minutes, correlated .59 and .57 respectively with the criterion in these two classes.

The predictive value of the tests progressively decreased in forecasting second, third, and fourth year marks. In the regression equations for the later years school marks received relatively higher Beta weights than those in the first year.

The relatively long Carnegie Pre-Engineering Inventory was found to be closely similar to our battery in predictive value.

The writer wishes to acknowledge the assistance of Miss Mary Lee Bininger in part of this study. (Slides)

3:35 PM Was college worth while? *Daniel Starch, Daniel Starch & Staff.*

PROBLEM: What do persons who have distinguished themselves in their respective fields consider they derived from their years in college?

POPULATION: Ninety-nine distinguished alumni of the University of Iowa, 89 men, 10 women, chosen by a committee. These included from business—6; education—17; engineering—5; journalism and writing—19; law, politics, public administration—25; medicine—9; religion—3; sciences—13; others—2.

PROCEDURE: Three questions were asked.

1. What are the three or four most outstanding values derived by you from college, post-graduate or professional training which have been most important in attaining eminence in your chosen field?

2. Did any teachers play an outstanding part in your accomplishments? If "yes", What about them influenced you most? (Please give names of teachers if you feel free to do so.)

3. As you look back at your college days, which of the following has been most valuable to you (1), which next (2), and so forth, in achieving eminence in your field? Please number all points.

(Seven points were listed)

RESULTS: Seventy-two of the 99 responded. As to Question 1, ability to think was mentioned by 39%, ability to express one's self 22%, high standards of performance 22%, development of personality 21%, broad grounding 21%, contact with fine personalities 21%, a philosophy of life 20%, training in scientific method 13%, learning to get along with people 11%.

The response to Question 2 was "yes" by all but four.

In response to Question 3, influence of great teachers was mentioned by 52%, training in knowing where and how to acquire further knowledge and skill 51%, skill in analyzing problems 39%, skill in deciding what to do 28%, understanding people 23%, actual knowledge or skill acquired 21%, influence of fellow students 10%.

MEASUREMENT PROBLEMS

4:00 PM, Thursday, Assembly Room

Volunteered papers selected by the division

ASAHEL O. WOODRUFF, Chairman

4:00 PM The tetrad technique and the centroid method in the development of a rating scale for teachers.

Blaise Laurier, University of Montreal.

PROBLEM: This report is a comparative study of the factors obtained by using factor analysis—Spearman's technique and Thurstone's method—in the treatment of experimental data from a tentative rating scale for teachers.

POPULATION: The results presented in this study are based on the ratings by 80 judges of 116 French Canadian religious teachers with regard to the character traits and abilities described in a tentative rating scale for teachers.

PROCEDURE: The following psychological tools were con-

structed: (1) a questionnaire intended to allow 51 educators from French Canada to express their opinions concerning the main character traits and abilities of a good teacher; (2) a rating scale devised according to the findings of the questionnaire. This scale, consisting of 24 traits and abilities, was applied to the 116 subjects of this study. The Spearman technique and the Thurstone method were successively used in the treatment of the intercorrelations of the ratings.

RESULTS: By the Spearman technique, the analysis has revealed the presence of three factors tentatively identified as general traits expressing: (1) the *professional dynamism* of the teacher; (2) his *psychophysical dynamism*; (3) his *ethical dynamism*. By the Thurstone method, the analysis has revealed the existence of three factors tentatively identified as follows: (1) *general aptitude to teaching*; (2) *sense of professional responsibility*; (3) *inspirational power and motivation of students*.

CONCLUSIONS: In spite of the two different methods used in the treatment of the data, there exists a striking homogeneity: (a) between the psychophysical dynamism and the general aptitude to teaching; (b) between the ethical dynamism and the sense of professional responsibility. With regard to the professional dynamism, it is a factor that has not been revealed by the Thurstone method. That may be explained by the high correlation between that factor and each one of the other two factors revealed by the Spearman method. With regard to the inspirational power and motivation of students, it is a factor brought to light by the Thurstone method.

4:15 PM The construction and differential value of a scale for measuring the attitudes of teachers toward pupils. Carroll H. Leeds, Furman University.

PROBLEM: The primary objective was to construct an attitude-measuring instrument that would differentiate teachers who have rapport with pupils from those who do not have such rapport. The assumption was made that a teacher's attitude toward pupils is an index to the rapport she has with them. Consideration was also to be given pupil reaction toward individual teachers whose attitudes had been measured.

POPULATION: 300 teachers of Grades 1 through 12; 12 principals; approximately 2500 pupils from Grades 4-6. These subjects were procured from 85 buildings in 15 public school systems in two eastern states.

PROCEDURE: The original Teacher-Pupil Inventory, consisting of several hundred opinion items relating to the nature and behavior of pupils, was administered to 100 teachers well liked by pupils and to 100 greatly disliked. The final Inventory consisted of 164 of the most discriminating items. Item responses were weighted in accordance with the differentiation established between the two groups of teachers.

The validity of the Inventory was determined by administering it to an unselected group of intermediate grade teachers, after having obtained ratings on these

teachers by (1) the pupils, (2) the principal, and (3) an expert.

RESULTS: 1. A validity coefficient of .60 was obtained when Inventory scores were correlated with the three ratings combined.

2. The means of the Inventory scores of the superior, unselected, and inferior groups of teachers were, respectively, 131.0, 77.6, and -32.0. The difference between the means of the superior and inferior groups yielded a critical ratio of 10.8.

3. The reliability of the Inventory was found to be .91.

4. Teachers scoring high on the Inventory were characterized by the pupils as being kind, friendly, understanding, willing to help, and able to explain clearly. Teachers making low scores were characterized as being "cross," "bossy," "fussy," and difficult to approach with problems.

CONCLUSIONS: 1. It is possible to measure a teacher's attitudes toward pupils in such a way that teachers who have rapport with pupils are differentiated from those who do not have such rapport.

2. The attitude of individual teachers toward pupils is significantly related to the pupils' attitudes toward the teachers.

4:30 PM How does marking on the basis of ability affect learning and interests? *Maurice E. Troyer, Syracuse University.*

The purpose of this study is to determine what effect grading on the basis of ability as compared with grading on the basis of achievement *per se* has on the learning and interests of pupils in the junior and senior high school.

Oneida, Norwich, and Little Falls are communities similar in size and in socio-economic status. Students in the Oneida Senior High School have been graded in accordance with ability for twelve years. Students in Norwich Junior High School have been similarly graded for five years. Conventional grading practices have been followed at all other grade levels in these two schools and in Little Falls.

The California Mental Maturity, Progressive Achievement, and Personality Tests have been administered to sixth, eighth, tenth, and twelfth grades in these three school systems. There are approximately one hundred students at each grade level in each of the schools.

Evidence summarized to date indicated that performance on regents examinations was significantly higher for those students who were marked according to their ability during the academic year.

The collaboration of Donald G. Wallace and Roy M. Hall is acknowledged.

4:45 PM Evaluation of psychological and educational changes in a three week school-camp experience. *Harry B. Gilbert and J. Wayne Wrightstone, Board of Education of the City of New York.*

PROBLEM: To evaluate the psychological and educational outcomes of an extension of schooling by means of sending pupils to camp for three weeks during the school term.

POPULATION: Two classes of children from the fifth and seventh grades of New York City Public Schools, totaling 62 pupils of both sexes.

PROCEDURE: Experimental pupils were matched with control pupils who did not go to camp. Pairing was based on grade, sex, chronological age, intelligence, and reading ability. Tests were constructed in Nature Study, Science and Health Education, Vocabulary and Arithmetic. An Interest Inventory was adapted. Sociometric data were obtained as well as a variation of the Who's Who technique. Children drew pictures and wrote letters on camping. These were evaluated by judgment rating scales. All of the foregoing were administered before and after camp to the experimental and control pupils. In addition, the experimental group was observed at camp, anecdotal records of behavior were made, and later each pupil was interviewed individually by a psychologist. Parents filled out questionnaires in order to obtain a poll of opinion of their attitudes about the school-camp experience for their children.

RESULTS: Experimental, or camp, group made definite gains over the control group in content areas that were tested and in the range of interests included in the inventory. Sociometric data were considered invalid due to change in social structure of group. There were many evidences of growth from clinical studies regarding significant changes in interpersonal and intergroup relations. This evidence was obtained from the anecdotal records and individual interviews by the psychologist.

CONCLUSIONS: The evaluation committee recommended extension of similar school-camp experiences for other children and a continuing and even more comprehensive evaluation of psychological and educational changes in children who engaged in this type of experience.

SYMPOSIUM: PROBLEMS OF TEACHING AT THE COLLEGE LEVEL

8:50 AM, Friday, Parlor A

Jointly organized with the Division on the Teaching of Psychology

WILLIAM A. HUNT, Chairman

Claude E. Buxton: Training for college teaching

C. R. Carpenter: Teaching aids

D. B. Harris: Methods in a general college

J. E. Horrocks: "Progressive education" in college teaching

Maurice E. Troyer: Field experience

Ronald Lippitt: Group methods

R. S. Crutchfield: Honors programs

DIVISION OF SCHOOL PSYCHOLOGISTS

SYMPOSIUM: CHANGING VISTAS FOR SCHOOL PSYCHOLOGISTS

8:50 AM, Tuesday, Parlor C

ETHEL L. CORNELL, Chairman

- A. Report of a national survey on the employment of school psychologists conducted by the Association of School Psychologists in the New York City schools
Presented by Morris Speevack
Discussed by Wilda M. Rosebrook
- B. The role of the school psychologist in psychotherapy
Participants: A. W. Combs, Bertha M. Luckey, Harriet E. O'Shea

PRESIDENTIAL ADDRESS

11:10 AM, Tuesday, Parlor C

MARGARET E. HALL: Current Employment Requirements for School Psychologists

SYMPOSIUM: APPROACHES TO MENTAL HEALTH IN SCHOOLS

1:40 PM, Tuesday, Parlor C

MILTON A. SAFFER, Chairman

- Gertrude P. Driscoll: The approach through curriculum
Norma E. Cutts: The approach through in-service teacher training in mental hygiene
Fritz Redl: The approach through the mental hygiene of both the individual and the group
Percival M. Symonds: The approach through the mental health of the teacher

BUSINESS MEETING

4:00 PM, Tuesday, Parlor C

DIVISION OF COUNSELING AND GUIDANCE PSYCHOLOGISTS

BUSINESS MEETING

7:00 PM, Wednesday, Parlor B

SYMPOSIUM: COUNSELOR TRAINING STANDARDS

1:40 PM, Friday, Assembly Room

CLIFFORD FROELICH, Chairman

- C. L. Shartle: Current developments in the professional standards for counselors and other guidance workers.
H. M. Bell: The problems of standards for counselor training.
Panel: Next steps in counselor training standards
Members of Committee on Counselor Training: R. N. Anderson, R. C. Bedell, W. Blaesser, Mitchell Dreese, Donald Super, and F. Zeran.

ATTITUDES IN COUNSELING

8:50 AM, Saturday, Georgian Room

Volunteered papers selected by the division

HAROLD SEASHORE, Chairman

- 8:50 AM A comparative study of attitudes toward certain vocational problems. Mitchell Dreese, George Washington University.
PROBLEM: The major purpose of this study was to discover differences and similarities which could be observed between the vocational attitudes of college students in 1935 and in 1948. The secondary purpose was to dis-

cover whether or not there were any significant group differences between the veteran and non-veteran populations in the 1948 sample.

POPULATION: The subjects in the 1935 group were 74 college students whose attitudes were reported by Freda D. Egbert in her Master of Arts thesis, "Attitudes of Young People toward Certain Present-day Vocational Problems." In 1948 the subjects were 432 members of General and Applied Psychology classes at The George Washington University. These groups were chosen in order to avoid using any subjects who had taken college courses in vocational guidance. Of these subjects, 295 were veterans and 137 non-veterans.

PROCEDURE: The questionnaire used was the one devised by Miss Egbert for her study. This questionnaire consisted of fifty statements regarding the choice of a job, securing a job, and achieving success. Each statement was answered either "true", "doubtful" or "false".

RESULTS: The results for each item of the questionnaire were tabulated and converted into percentages. Comparisons were made for each item between the college students of 1935 and 1948, and within this latter group, between veterans and non-veterans. The 1935 and 1948 groups showed significant differences with respect to seventeen items. In the comparison of veterans and non-veterans sixteen items showed significant differences.

CONCLUSIONS: Although the expressed vocational attitudes of college students are essentially the same in 1948 as they were in 1935, significant differences exist which are probably explainable in terms of changed economic

conditions. The differences between veterans and non-veterans in 1948 are as great as the differences between 1935 and 1948 non-veteran populations.

This study was conducted jointly with Dorothy F. Snyder, Student Affiliate of APA.

9:05 AM The subtle-obvious factor in vocational and educational success. *Daniel N. Wiener, Minneapolis, Minnesota.*

PROBLEM: Can success in selling, trade and clerical training, and college work be predicted on the basis of differences between subtle and obvious personality test scores?

POPULATION: Salesmen, success defined by supervisors' ratings; clerical and trade trainees, success defined by progress in training; college students, success defined by school grades.

PROCEDURE: (1) Subtle (S) and Obvious (O) key results were studied for employed salesmen, clerical and trade trainees, and college students to determine if the differences between subtle and obvious symptoms were significant in predicting success. (2) A simple point formula was developed based on the difference between S and O for each of five scales, yielding combined results on a scale of from plus five to minus five. (3) The significance of percentage differences in elimination of successful and unsuccessful individuals at various cutoff points was studied.

RESULTS: (1) The number of individuals eliminated by the formula at given cutoff points was significantly greater for the unsuccessful than for the successful. (2) The trend of differences between the successful and unsuccessful was the same for the three groups although the distributions were different and the optimum cutoff points varied. (3) The higher the S scores were above the O, the more likely was success; the higher the O scores were in relation to the S scores, the more likely was failure.

CONCLUSIONS: (1) Subtle and Obvious keys for the Minnesota Multiphasic Personality Inventory can be used to help predict the success of various occupational and educational groups. (2) High S scores in relation to O scores tend to be predictive of success, while O scores high relative to S scores, of failure. (3) The same keys and formula can probably be used successfully in a wide range of occupational and educational situations although different cutoff points will have to be used.

9:20 AM Can vocational counselors predict the expressed attitudes of their counselees toward the counseling situation? *Ray C. Hackman, University of Maryland.*

PROBLEM: This study is concerned with the problem of establishing a method by which a counselor's insight into the attitudes of his counselees can be measured and then

describing counselor differences on the basis of such an instrument.

POPULATION: The sample consists of six counselors at the University of Maryland Guidance Clinic together with 204 cases completed by them during the period from November 24, 1947 to April 1, 1948.

PROCEDURE: Two series of statements reflecting either favorable or unfavorable attitudes toward specific aspects of the counseling situation were developed. One series contained negatively phrased statements, the other positively phrased statements. At the end of each terminal interview the counselee was asked to check whether he agreed or disagreed with each statement on one blank. At the same time, the counselor, in private, checked an identical blank in the way in which he would anticipate the counselee would answer it. At no time during the course of the study were the counselors aware of the extent to which they were guessing correctly the reactions of the counselee.

RESULTS: Both series of statements yielded skewed distributions of satisfaction scores toward the favorable end of the distribution; the indices varying from 8 out of 26 statements checked favorably to 26 out of 26. The extent to which counselors could anticipate the responses of the counselees is evidenced by a range of correct guesses from 1% to 100%. Evidence was found for differential success in guessing in relation to a) method of phrasing the statement, and b) aspect of the counseling situation represented.

CONCLUSIONS: The results suggest the feasibility of using the technique for assaying the effectiveness of counseling. It appears that considerable variation is to be expected from counselor to counselor with regard to their ability to correctly identify the verbally expressed attitudes of their counselees.

The author wishes to express his appreciation to Mrs. Martha Maxwell who collected and analyzed the data for this study.

9:35 AM Counseling needs in adult education. *Albert C. Van Dusen, Northwestern University.*

PROBLEM: To determine the needs of individuals who seek counseling in the growing adult education movement by a critical analysis of current client records in an adult counseling program of a university serving a metropolitan community.

POPULATION: 115 adult student clients were investigated. Each was exposed to a 16-week counseling program including testing, individual conferences, and group consideration of such topics as (1) human needs, (2) problem solving methods in conflict situations, (3) how attitudes are formed, and (4) development of a self plan of action.

PROCEDURE: The clients' initial expressions of why they needed counseling were classified into vocational, educational, personal-social or some combination of these problem areas. Shifts in problem areas during counsel-

ing were noted. Score distributions were examined for: Otis Self-Administering Test, Kuder Preference Record, Allport-Vernon Scale of Values, Minnesota Multiphasic Personality Inventory, and Bell Adjustment Inventory. The number of individual conferences and group sessions needed by clients to work out their own plans of action were determined.

RESULTS: Although the program was called vocational counseling, only 51% of the clients initially stated that they were concerned with a purely vocational problem. About one-half of these recognized some additional problem before completion of counseling. Nearly 25% indicated that their problem included some personal-social concern. Test analysis indicated that the adult clients seeking counseling in an evening college are not atypical. Most of them had five or six conferences with an individual counselor and attended about six group sessions while working out their own plans of action.

CONCLUSION: Growing emphasis upon adult education demands development of strong, comprehensive counseling programs to meet vocational, educational, and personal-social needs of adult students. A program combining opportunity for group consideration of selected topics with individual conferences aids mature individuals to develop positive plans of action to meet their problems.

SYMPOSIUM: SOME OF THE PROBLEMS OF VETERANS GUIDANCE

10:00 AM, Saturday, Georgian Room

H. S. CONRAD, Chairman

Participants: Marion Bartlett, Frederick Gaudet, Russell Leiter, Ira D. Scott, Louis Long, Joseph Moore

QUANTITATIVE GUIDANCE STUDIES

12:00M, Saturday, Georgian Room

Volunteered papers selected by the division

FRANCES TRIGGS, Chairman

12:00 M A factorial study of selected instruments for measuring personality and interest. Wm. C. Cottle, University of Kansas.

PROBLEM: To determine by factor analysis whether there are any common factors measured by the Minnesota Multiphasic (Short Group Form), the Bell Adjustment Inventory (Student Form), the Strong Vocational Interest Blank, and the Kuder Preference Record.

POPULATION: Four hundred adult males taking all four of the above tests in the veterans testing program at the Psychological Services Center, Syracuse University.

PROCEDURE: Pearsonian correlation coefficients were computed on raw scores of all subtests in the above tests except the question score of the M. M. P. I. (All subjects with raw scores above 20 on the question key, and above nine each on the L and F keys were eliminated

from the study to guard against invalidating results.) Thurstone's complete centroid method was used in the extraction of factors. Centroid loadings were extracted until the standard deviation of the coefficients in the residual matrix was less than the standard error of the average r of the original matrix.

RESULTS: Eight sets of centroid loadings were extracted before this criterion was met. Rotation of these is begun. Results and conclusions will be completed by September, but are not available at present.

12:15 PM The construction and validation of a silent and auditory work-type comprehension reading test. George Spache, New York University.

PROBLEM: We will attempt to describe the construction and validation of a pair of parallel reading comprehension tests, the Silent and the Auditory. The Silent takes the common form of measuring comprehension of selections of high school textual materials. The Auditory, which parallels the Silent in length, difficulty, and reading selections, is presented by reading all materials to the students. It is a measure, we believe, of the student's background and potential ability to comprehend high school texts. Its format prevents his actual reading skill from distorting the results, as may happen in the usual type of reading test, and reveals instead the extent to which he is capable of understanding the types of materials to which he will be exposed.

POPULATION AND DATA: Three editions of these tests have been used in experimental forms. Item validities, reliabilities, and intercorrelations with other tests of reading and intelligence have been determined. The experimental editions were validated on a ninth-grade level with a population of approximately 100 students.

PROCEDURE: These validity and reliability data will be interpreted. In addition, studies have been made of the influence of the format of the test and of the role of intelligence upon the results.

RESULTS AND CONCLUSIONS: From these data, the advantages of the use of these two methods of analysis of actual and potential reading ability will be pointed out. Indications for the need for type and possible outcome of remedial work will be given.

12:30 PM An experimental longitudinal study of youth counseling. John W. M. Rothney, University of Wisconsin, and Bert A. Roens, Arlington, Mass.

PROBLEM: To determine the effect of counselling high school youth upon their post-school vocational, educational and social adjustments.

POPULATION: One hundred and twenty nine eighth grade youth selected from a population of five hundred counselled subjects were paired on the basis of seven factors with a like number of non-counselled youth in the same school.

PROCEDURE: Intensive study of the experimental subjects was made to determine the counselling needs of

each individual. Counselling procedures were adapted to meet these needs but since the experiment was carried on over a five year period, frequent revision of analyses and procedures were required. Intensive work with parents and school personnel supplemented the youth counselling.

During the senior year in high school, one year after the subjects had left school and again, in some cases, in 1947 (eleven years after initial contact) checks were made upon the vocational, educational and social performances and adjustments of the experimental subjects. Comparisons were made with those of the controls.

RESULTS: Statistical and case data obtained by interview and controlled questionnaires revealed significant differences between counselled and non-counselled subjects in each of the areas studied. Specific study of responses of subjects under the general headings of vocational satisfactions and achievements, educational accomplishments, continuing educational interests, and personal-social adjustments indicate the superiority of the counselled subjects.

CONCLUSIONS: A program of counselling which extends over the five year secondary school period and which is designed to meet particular needs of students makes

significant contributions to the accomplishment of the objectives of the American secondary school.

12:45 PM Separation of sex groups in test reporting. *Alexander G. Wesman, The Psychological Corporation.*

The desirability of presenting separate norms for each sex, and of analyzing the reliability and validity of tests for separate sex groups, has been insufficiently appreciated. The effect of combining sex groups into single norm groups may be to obscure important differences and result in serious misinterpretation of test scores. This is illustrated by such tests as Mechanical Comprehension, in which boys' scores are superior to those of girls; Language Usage, where girls are superior; and other tests frequently used by counsellors.

Separate data for sex groups is also required in the investigation of the reliability and the validity of tests. A test may be quite reliable for one sex group but relatively unreliable for the other sex, despite age and educational equivalence. Validity may also differ from one sex to the other. Data illustrating these points will be presented, and implications of these principles for reporting in test manuals and research papers will be discussed.

DIVISION OF PSYCHOLOGISTS IN PUBLIC SERVICE

BUSINESS MEETING

2:50 PM, Thursday, Parlor D

DIVISION OF MILITARY PSYCHOLOGY

VISUAL PROBLEMS IN EQUIPMENT DESIGN

8:50 AM, Tuesday, Salle Moderne

Volunteered papers selected by the division

ALPHONSE CHAPANIS, Chairman

8:50 AM Area and intensity relations in the perception of radar signals. *Stanley B. Williams, The Johns Hopkins University, and Neil R. Bartlett, Hobart College.*

PROBLEM: The detection of radar signals on an intensity modulated cathode-ray tube screen is essentially a differential brightness discrimination. This experiment was designed to determine precisely the interdependence of area and intensity as they contribute to the making of this discrimination on radar scopes.

OBSERVERS: Two highly trained observers were used.

PROCEDURE: A specially designed electronic signal generator manufactured simulated radar signals in such a way as to permit independent control of the length, width and brightness of the images displayed on the phosphor screen of a 7BP7 cathode-ray tube. Contrast thresholds were determined by a method of adjustment for 64 image

sizes varying from the smallest permitted by the resolution of the tube (essentially a point of light) to a large patch about 3.5 by 7.5 degrees in retinal subtense, which is several times larger than any likely to appear on operating radars. This range is much wider than any heretofore studied. Determinations were made at each of three background brightnesses: approximately 2 ml., 0.1 ml., and less than 0.001 ml.

RESULTS: A family of eight curves shows that the contrast threshold steadily decreases as either dimension of the area is enlarged. The decrease in one dimension (pulse length) is greater than in the other, probably because of different exposure rates inherent in this form of display. The effect of area on visibility can be very great relative to that of other variables affecting signal detection. For example, the advantage of the largest over the smallest area is 20, 23 and 28 db, on a scale of relative visibility, for the darkest, medium, and brightest backgrounds, respectively.

CONCLUSIONS: Variations in image size are a primary factor in the visibility of images produced by signals on certain radar scopes.

ACKNOWLEDGMENT: This research was performed under

Contract N5-ori-166, Task Order I, between the Special Devices Center, Office of Naval Research, and The Johns Hopkins University.

9:05 AM Eye movements of aircraft pilots during instrument flights. *Paul M. Fitts, Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio.*

PROBLEM: In order to further our understanding of how the eyes are used in a task demanding rapid "check reading" and interpretation of complex visual displays, measurements were made of pilots' eye movements while flying by instruments without visual reference to the ground.

POPULATION: Forty USAF pilots, representing a range of experience from "typical" to "expert," were used as subjects.

PROCEDURE: Captain R. E. Jones or Lt. J. L. Milton were in charge of all flights and collaborated in the study. A 35 mm movie camera was used to photograph reflections of pilots' eyes in a small mirror mounted on the instrument panel of a C-45 aircraft. Records were taken on each subject during five different precision maneuvers, and during two blind approaches made using the USAF Instrument Landing System (ILS) and two approaches made with Ground Controlled Approach (GCA).

RESULTS: Reliability of scoring procedures was satisfactory. Eye fixation times, fixation frequencies and per cent of time spent on each of eight instruments were tabulated. Data were analyzed in reference to maneuvers, experience level and individual differences. For the instrument panel and aircraft-used, average fixation times for different instruments during an ILS landing approach varied from 0.3 to 0.9 seconds per fixation; different flight and engine instruments were "looked at" from 1 to 30 times per minute; 92 per cent of all fixations were on four instruments; most eye movements were in the horizontal plane; right-left movements occurred as often as those from left to right.

CONCLUSIONS: Average eye fixations on aircraft instruments are from two to three times as long as fixations in reading. It appears that eye movement patterns may be a function of difficulty of interpretation, reading precision necessary, and importance of the displayed data. (Slides)

9:20 AM Speed and accuracy of multi-revolution instrument readings in relation to indicator design. *Walter F. Grether, Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio.*

PROBLEM: Data from aircraft accidents and pilots' reports show that gross errors in reading altimeters and other multi-revolution indicators are a serious accident hazard. The purpose of the present experiment was to determine the causes of such errors in quantitative read-

ing and evaluate other possible indicators for such data requiring great scale length.

POPULATION: The subjects used in this experiment were 97 USAF pilots and 79 college students without aviation training.

PROCEDURE: Nine experimental indicators were presented in printed test booklets, with 12 different settings on each instrument. Beneath each instrument picture was a space in which the subject entered the numerical value of the reading. The average time per reading and the errors for each indicator design provided the data available for analysis.

RESULTS: Variations in indicator design caused very large differences in speed and accuracy of reading. The proportion of pilots' readings in error was 15.9 per cent for the conventional three-pointer altimeter, 3.5 per cent for a pointer-counter combination, and 0.6 per cent for a direct-reading counter. For the same indicators and subjects the time per reading (and recording) was 9.6 seconds, 4.2 seconds, and 2.5 seconds. The correlation between speed and accuracy for the nine different designs was +.91. College students gave virtually the same results as pilots. The conventional altimeter was frequently read 1,000 feet higher than it indicated.

CONCLUSIONS: Among the conclusions drawn are that: (a) the reading of a single numerical value from two or more instrument pointers is a difficult task; (b) such instruments are frequently read too high by a complete revolution of the sensitive pointer; (c) quantitative reading errors on multi-revolution instruments can be reduced considerably by changes in indicator design; and (d) instruments read most rapidly tend also to be read most accurately. (Slides)

9:35 AM Speed and accuracy of reading instrument dials as a function of spectral distribution and intensity of illumination. *S. D. S. Spragg, University of Rochester.*

The experiments to be reported are part of a visual research program under contract with the Air Materiel Command, Wright Field. The research assistance of Milton L. Rock is acknowledged.

PROBLEM: To determine the relative speed and accuracy of reading photographic reproductions of instrument dials as a function of: (1) the spectral distribution of illumination; and (2) intensity.

POPULATION: Approximately 20 young male adults, rigorously screened for visual abilities.

PROCEDURE: Dial reproduction materials developed by Dr. William Kappauf, as well as the essential procedures reported by him, were employed. Mazda light sources were used. Intensity was controlled by means of diaphragms. Spectral distribution was controlled by use of sharp "cut-off" and by narrow-band filters, with most attention being directed to the red and red-orange re-

gion of the spectrum. S's were instructed to read banks of 12 dials as rapidly and as accurately as possible.

RESULTS: The experiments with brightness as chief variable indicated that a sharp improvement in speed and accuracy occurs at approximately .02 foot-lamberts. From .02 to the highest level tested (6.0 foot-lamberts) there was no significant improvement. Results with sharp "cut-off" filters at two brightness levels (.01 and .1 foot-lamberts) indicate spectral "cut-off" has relatively slight effect on speed and accuracy of dial reading. Studies employing narrow band filters are in progress.

CONCLUSIONS: The present results indicate that: (1) when brightness is sufficient to permit clear seeing of dial and pointer, further increases in brightness are relatively unimportant as far as speed and accuracy are concerned. Fatigue effects have not yet been measured. (2) When apparent brightnesses are matched speed and accuracy of dial reading in this situation seem to be but slightly affected by the spectral distributions of light provided by the sharp "cut-off" filters. (Slides)

SYMPOSIUM: PROFESSIONAL CONSIDERATIONS IN ORGANIZED RESEARCH

10:00 AM, Tuesday, Salle Moderne

MORTON A. SEIDENFELD, Chairman

Speakers: A. G. Bayroff, Stuart W. Cook, Angus Campbell, and Arnold M. Small.

Panel: Harold C. Taylor, Jack Buel, Charles I. Mosier, and J. Donald Harris.

Military and civilian research organizations offer exceptional professional advantages in terms of salary, equipment, research budgets, technical and clerical assistance, travel, and relief from teaching. Opposed to these advantages are problems associated with administrative duties, publication policies, library facilities, research freedom, and job specialization. Psychologists working in research organizations will discuss the professional satisfactions and problems in their respective organizations.

BUSINESS MEETING

1:40 PM, Tuesday, Parlor B

SYMPOSIUM: HUMAN BEINGS AS SERVO MECHANISMS

2:50 PM, Tuesday, Parlor A

LEONARD C. MEAD, Chairman

Speakers: Douglas G. Ellson, Franklin V. Taylor, John L. Kennedy, and John R. Ragazzini.

Panel: Walter R. Miles, Paul M. Fitts, W. J. Brogden, Louis D. Hartson, Judson S. Brown, and Robert H. Seashore.

As operators of machines, human beings fill much the

same role as servo-mechanisms which convert feeble signals from sensing devices into appropriate action with greatly amplified power. A comparison will be made of human response characteristics with those of electrical, mechanical, and hydraulic servo-systems. The value this line of investigation may have for improving the designs of man-operated machines, while at the same time achieving greater insight into human behavior, will be discussed.

GENERAL MILITARY PROBLEMS

11:10 AM, Wednesday, Parlor B

Volunteered papers selected by the division

JOHN T. COWLES, Chairman

11:10 AM The psychogalvanic response as an indicator of emotional reaction to personality test items.
Charles N. Cofer, University of Maryland.

PROBLEM: To determine whether the psychogalvanic response is an index of emotional reaction to personality test items.

POPULATION: Twenty-five male college sophomores.

PROCEDURE: The Tarchanoff effect was measured for each S while he responded to a series of items from the Minnesota Multiphasic Personality Inventory (individual form). At a second session, each S was interviewed concerning his responses to certain of the items. To some of these items he had given large psychogalvanic responses; to others, little galvanic response was given. Total scores on the Inventory were determined for each S.

RESULTS AND CONCLUSIONS will be presented in terms of the following method of analysis. The total group of Ss was divided into two sub-groups: One consisted of those Ss who showed high scores on the scales of the Inventory and the other contained the Ss whose scores were within normal limits. These sub-groups are considered as criterion groups, and the emotional significance of both the PGR data and the interview data is judged in terms of comparison of the sub-groups. By such a procedure, "emotional involvement" on the test items can be gauged objectively and more meaningfully than would be possible without an external criterion. Specific aspects of the data to be described comparatively are as follows: amplitude of PGR to all items; amplitude of PGR on items to which "abnormal" verbal responses were given as compared with those on which "normal" responses were given; the apparent emotional significance of the verbal response and PGR as judged by the interview material.

The author wishes to acknowledge the assistance of Mr. A. J. Judson and Mr. D. W. Weick, who collected the data for this study. This investigation was conducted under contract N7-onr-397, Task Order III, between the Office of Naval Research and the University of Maryland.

11:25 AM Accuracy of estimation of aircraft speed.

William C. Biel, Aero Medical Laboratory, Wright-Patterson Air Force Base, and Guy E. Brown, Jr., Eastern Washington College of Education.

PROBLEM: To determine the accuracy with which the speed of six types of aircraft could be estimated visually by ground observers, and the effects of target speed, range, elevation, and course direction on this accuracy.

POPULATION: Twenty commissioned officers from the Army Antiaircraft Artillery Officers Replacement Pool at Fort Bliss, Texas.

PROCEDURE: The officers recorded their private estimations of the speed of individual aircraft flying straight-and-level courses which varied in direction, speed, elevation and "least slant range" (within the range of automatic weapons) on different approaches. Aircraft used were the AT-11, B-25, B-26, P-47, P-63 and PQ-14, and each plane was flown at speeds varying approximately from its minimum to maximum.

Basic criterion data gathered from visual tracking and radar range were used for computing ground speed over each course and for checking constancy of speed within each course.

RESULTS: There was a slight tendency for the speed of these aircraft to be overestimated when each plane was flown below its approximate cruising speed and a consistent tendency for the speed to be increasingly underestimated as a plane was flown at higher and higher speeds. The trends indicate that the speeds of pursuit planes were underestimated less than were those of other planes.

Differences in direction of the courses had no significant effect on the accuracy of the estimates.

Consistency of individual differences in estimations varied with types of planes, differences in speed, etc.; these results will be reported.

CONCLUSION: Estimations of aircraft speed are greatly influenced by the speed that a plane is flown and by knowledge of the performance characteristics of the aircraft. These errors are of such a magnitude as to introduce large errors in antiaircraft gunnery when gun sights are used where speed of the target must be estimated. (Slides)

11:40 AM Optimal design factors for making settings on a linear scale. *William Leroy Jenkins, Lehigh University.*

PROBLEM: To determine the optimal ratio between knob and pointer movement in making settings on a linear scale, and to investigate the influence of associated design factors.

POPULATION: One female and five male subjects, three of them former radar operators.

PROCEDURE: Apparatus was designed to measure the time required to make settings on a linear scale using a rotating knob. The accumulated action potentials from the subject's active forearm were also measured. Vari-

tions of ratio, tolerance, knob diameter, and backlash were systematically introduced.

RESULTS: The optimal ratio for all subjects is approximately one inch of pointer movement for one complete turn of the knob. This remains true whether the subject uses the right or the left hand. As long as the optimal ratio is used, more severe tolerance requirements (within reasonable limits) do not materially increase either the time or the action potential developed. In terms of time, knob diameter makes little difference, as long as the knob is of a size that can be conveniently grasped. The least action potential is developed, however, with knob diameters between two and three inches. Backlash, even in excessive amounts, does not affect either time or action potential when the optimum ratio is used.

This research was sponsored by the Watson Laboratories, Army Air Forces, Materiel Command. The aid of Minna B. Connor in conducting the experiments is acknowledged. (Slides)

MEASUREMENT AND PREDICTION OF PROFICIENCY

10:00 AM, Thursday, Parlor A

Volunteered papers selected by the division

JOHN W. MACMILLAN, Chairman

10:00 AM Techniques for measuring the proficiency of military aircraft mechanics. *Howard J. Hausman and Philip H. Mitchell, USAF, Strategic Air Command.*

An experimental battery of aptitude tests is now being routinely administered to Air Force recruits. Some of the men tested subsequently attend aircraft mechanic schools and are assigned to aircraft maintenance jobs. In order to validate the experimental selection tests for mechanics, measures of on-the-job proficiency were judged to be superior to previously used criteria of technical school success.

Devices and procedures for securing criterion data were based upon analyses of results obtained in previous investigations of aircraft mechanic proficiency conducted in the Strategic Air Command. Success on the job is considered to involve: (1) Demonstrable skill in performing job operations; (2) Possession of necessary technical job knowledge; (3) Manifestation of efficient work habits and favorable work attitudes; and (4) Adjustment to the job in a military setting.

In order to measure the above components, the following instruments and related procedures have been developed for experimental tryout:

1. A check-list of maintenance tasks to be used independently by two trained evaluators for recording observations of the mechanic's work.

2. A work habits and attitudes scale, for independent ratings by the supervisors in closest contact with the mechanic's work. The items in the scale are written in

terms of specific instances of mechanics' behavior, obtained from an earlier field study.

3. A personal information blank, on which the mechanic records data related to his background and interests.

4. A brief rating device for use by the supervisor in assessing the mechanic's overall value to the unit.

In process of development is a technical information test.

A report will be made on the feasibility of these measures and their associated techniques, as applied to mechanics on the job. Experimental try-out on approximately 100 mechanics will form the basis for discussion.

10:15 AM The development of proficiency measures for military technical specialists. *Richard H. Henneman, University of Virginia.*

Extensive research has been conducted in the Strategic Air Command on the development of proficiency measures for aircraft mechanics. The findings are believed to be generally applicable to military technical specialists. Four principal sources of proficiency data were systematically investigated: (a) technical information tests; (b) practical performance tests ("work samples"); (c) work production records; (d) subjective assessment of worker proficiency (by supervisors and associates).

Each of these four types of proficiency data were subjected to a three-fold evaluation analysis as follows: (a) theoretical advantages; (b) critical standards (necessary conditions to be met in order to provide good measures of job success); (c) practical limitations (when applied to workers on the job). Because of practical limitations, some potential proficiency data (e.g., practical performance tests and work production records) were found to be less promising than others. Statistical analysis of data obtained from several types of subjective assessment (when based on concrete evidence of job performance and secured through interviews) revealed satisfactory distribution and reliability.

The following conclusions appear warranted. The theoretical advantages of potential proficiency data must be evaluated in terms of critical standards and practical limitations when actually applied to the measurement of worker proficiency. When critical standards are defined and satisfied, potential proficiency data afford much better measures of on-the-job success than when such standards are ignored. Future research on the development of proficiency measures for military technical specialists should place greater emphasis on determining critical standards in advance of actual collection and analysis of data. Such an emphasis should substantially reduce the amount of purely "exploratory" investigation which has usually characterized research on proficiency data in a new field.

10:30 AM Comparison of Army and Navy classification tests. *Julius E. Uhlaner, Personnel Research Section, AGO and Everett G. Brundage, Bureau of Naval Personnel.*

PROBLEM: With the view toward possible coordination of classification instruments of the Army, Navy and Air Force, the question was raised: "How does the Army Classification test battery compare with the Navy classification test battery?"

POPULATION: The population consisted of 1052 naval recruits.

PROCEDURE: Both the Army and Navy batteries of tests were administered to the above population. This population was split in two halves and the order of presentation counterbalanced to control the effects of practice.

Conversion tables were computed for each of the Army tests in terms of Navy standard scores and for each of the Navy tests in terms of Army standard scores.

Intercorrelation coefficients were computed for 18 variables: 8 Navy sub-tests, 9 Army sub-tests and years of education. In addition, factor analyses were conducted independently on the two samples of the total population.

RESULTS: Conversion tables were constructed for each of the Army and Navy classification tests. Tables were prepared for the Army tests in terms of Navy standard scores and for the Navy tests in terms of Army standard scores. The Army and Navy classification test batteries were measuring common factors primarily. In addition, there were some specific factors primarily defined by the information tests but which were not too well extracted in this study.

CONCLUSION: Through the use of the conversion tables developed in this study, it is now possible to use both Navy and Army standard scores for each of the Army or Navy classification tests. In terms of the factors extracted from each of the Army and Navy batteries of tests there is considerable similarity and it should be possible to consolidate classification batteries in the future. There are, however, many administrative and other technical problems which must be solved before coordination of classification instruments is made possible.

10:45 AM Validation of job proficiency tests for the Army food service field. *Charles H. Goodman, Personnel Research Section, AGO.*

PROBLEM: To determine the validity of objective written job knowledge tests which are designed for use in a battery of instruments for selecting the best qualified enlisted men for promotion.

POPULATION: The validation population consisted of 1861 enlisted men assigned to jobs in the food service field.

PROCEDURE: Criterion data on men in lower level jobs consisted of buddy ratings. Men in higher level posi-

tions were rated by subordinates on terms of scaled free response opinions about quality of work. Additional data involved appraisal by subject matter experts of each item in terms of difficulty, adequacy of response and applicability. Items and total scores were analyzed against the criteria and findings analyzed in terms of experts' reviews of the items.

RESULTS: The preliminary forms of the tests contained a larger number of easy items than the subjective appraisal had indicated. These items apparently tended

to pull down the over-all validity of the preliminary tests. The validity coefficients for the final tests were improved appreciably by eliminating the easy items as well as those specific items with negative and zero validity. **CONCLUSIONS:** 1. Objective written tests possess validity as indicators of quality of job performance for such jobs as cooks, bakers and mess steward. 2. Judgments of Test Experts and Subject Matter Experts with respect to the difficulty level of the test items were not consistent with the results of item analysis against criterion data.

DIVISION ON MATURITY AND OLD AGE

BUSINESS MEETING

5:00 PM, Wednesday, Parlor D

SYMPOSIUM: CURRENT RESEARCH PROGRAMS IN THE PSYCHOLOGY OF AGING

10:00 AM, Thursday, Parlor B

OSCAR J. KAPLAN, Chairman

Nathan W. Shock: The program of the Gerontological Unit of the U. S. Public Health Service.

Ernest W. Burgess: A long range longitudinal study in aging at the University of Chicago.

Martin L. Reymert: The Moosehaven Laboratory for Research in the processes of aging.

MATURITY AND OLD AGE

1:40 PM, Thursday, Parlor D

Volunteered papers selected by the division

OSCAR J. KAPLAN, Chairman

1:40 PM Measuring personal adjustment in old age. R. J. Havighurst and E. W. Burgess, *University of Chicago*.

PROBLEM: To devise a measure of personal adjustment in old age.

POPULATION: Total group of 2,982 schedules, filled out by persons sixty years of age and over and small groups selected from this sample for testing the reliability and validity of the measures of personal adjustment in old age.

PROCEDURES: The exploratory portion of the study was devoted to securing a limited number of case studies, the devising of a preliminary schedule and testing it out. The schedule was distributed by mail and by personal contacts and by interviews. Where feasible, field workers or other observers filled out a check list and a pen portrait on the subjects.

RESULTS: Two measures of adjustment in old age were derived from the study. The first is an index of activities, indicating the participation of the subject in the chief sectors of experience and the second is an index of

attitudes in different fields, such as economic security, family, friends, work, recreation, religion and feelings of usefulness.

CONCLUSIONS: There is a correlation between reports by older persons of their participation in activities and their subjective attitudes toward them. The attitude index was correlated with ratings by observers upon their social adjustment.

The collaboration of Ruth C. Cavan is acknowledged.

1:55 PM Attitudes toward retirement and old age. Albert R. Chandler, *Ohio State University*.

PROBLEM: To investigate attitudes toward retirement and old age held by persons in middle life and in old age. **POPULATION AND PROCEDURE:** A questionnaire was prepared including the 14 questions used by G. Stanley Hall and reported in his *Senescence* (1923), and adding 15 other questions. This questionnaire was sent to (a) 200 persons listed in *Who's Who in America*, 1946-47, half of them aged 70 or older and half of them in their forties; (b) 200 alumnae of Vassar College in the classes of 1897 and 1922; (c) 100 members of two professional men's clubs in Columbus, Ohio, about half of whom were college professors; (d) 20 emeritus professors of Ohio State University. About 120 replies were received. The comparative frequency of different replies is noted.

RESULTS AND CONCLUSIONS: Few of the middle-aged respondents showed much imagination regarding their later years. Most of them expected that they would be sufficiently occupied, after retirement, with one or more of such pursuits as gardening, golf, reading, and travel. Some were resolved never to retire unless forced to do so by ill health. A majority planned to continue living in their present homes. Few respondents past 70 admitted that they had any temptations or any serious regrets; few admitted that they were increasingly irritated by opinions and attitudes of others; few relied on doctors except in emergencies; few claimed to derive benefit from the clergy. There were sharp differences of opinion regarding systems of compulsory retirement. Responses to

Hall's questions were mostly similar to those he received 25 years ago.

2:10 PM Age trends in adjustment during the adult years as reflected in happiness ratings. *Raymond G. Kuhlen, Syracuse University.*

PROBLEM: This is one of several studies underway at Syracuse University having for their purpose the assessment of personal adjustment during the adult life span and the determination of adjustment problems typical of various ages.

POPULATION: Approximately 300 adults, ranging in age from the 20's to over 80 and about equally divided among married men, married women, and single women, were studied.

PROCEDURE: Each subject was asked in interview to draw on a chart a line representing his level of happiness at various ages in his life thus far. Up to this point the interview was relatively unstructured, but once the "happiness curve" was sketched questions were directed to the circumstances causing a rising or dropping curve. Indexes of happiness and relative frequency of happy and unhappy episodes were computed for each semi-decade and reasons for these episodes analyzed.

FINDINGS: Happiness ratings tend to increase to the 20's and 30's and to decrease thereafter. Both happy and unhappy episodes were most frequent in the 20's, occurring with decreasing frequency thereafter. Major causes of happiness among married men and women were related to romance, marriage, family. Among married men and unmarried women occupation constituted a major source of happiness. Bereavement and poor health were major sources of unhappiness for all groups studied, while occupational difficulties caused much unhappiness for married men and single women. Various age groups differed in the reasons they gave for happy and unhappy episodes.

CONCLUSIONS: The procedure employed seemed useful as a means of quantifying certain aspects of the life history. Young adulthood is the happiest period of life. Each age period is characterized by particular problems, but the 20's appear to need particular study—perhaps more so than adolescence. The importance of studying age trends against a background of cultural events is apparent.

2:25 PM Attitudes and activities of the middle-aged and aged. *L. Pearl Gardner, Spring Grove State Hospital.*

PROBLEM: To study the attitudes and activities of the aged in their interpersonal relationships in the homes of the middle classes.

POPULATION: A group of 193 aged people living with relatives for the most part: More than $\frac{2}{3}$ were 70 years and over; and $\frac{1}{3}$ were women.

PROCEDURE: Information was gained by interview with questionnaire.

RESULTS: Health was reported to be good with only 1 in 5 in poor health, with an average of 2.6 kinds of medicine taken. However half of them talked about their medicines and aches. Happiness was reported by all but one in ten with a strong positive relationship to economic independence. Most of them felt their dispositions had remained the same; however, more than two-thirds felt their worst fault to be irritability and quick temper. Strong social interests were shown by 80%. Two-thirds or more spontaneously remarked that they felt unwanted and in the way. Two-thirds of them reported family criticisms centered mostly about the interference of these old people in family affairs and somewhat about their personal habits. Most of them indulged in daydreaming of the past.

CONCLUSIONS: Frustrating conflicts of the aged center to a large extent in dominance relationships and social isolation. There is need for adequate therapy for the aged to adjust happily to their changed social situations.

SYMPOSIUM: PSYCHOPHYSIOLOGICAL CHANGES WITH AGE

4:00 PM, Thursday, Library, American Academy of Arts and Sciences

Jointly organized with the Conference on Aging of the American Academy of Arts and Sciences.

ROSS A. MCFARLAND, Chairman

Departmental and other artificial lines among areas of knowledge often result in the failure of various specialists to see problems and findings in their larger implications. Approaches are apt to be narrow and provincial; integrated understandings are unlikely. The purpose of the two joint symposia is to afford opportunity for exchange of ideas and information, and thereby to stimulate inter-disciplinary thinking regarding problems of aging. Representatives of psychology, economics, sociology and the medical sciences will form round tables for the discussion of problems of common interest. Participants will be announced later.

MATURITY AND OLD AGE

1:40 PM, Friday, Parlor B

Volunteered papers selected by the division

RAYMOND G. KUHLEN, Chairman

1:40 PM Preliminary data on life histories of senescent twins. *Franz J. Kallmann, New York State Psychiatric Institute.*

PROBLEM: The main objective has been to study the range of variations in the capacity for biological adaptation and emotional adjustment to aging and longevity under experiment-like conditions, in order to obtain

comprehensive data on the interaction of factors producing significant differences in the ability to maintain a state of health until the period of senescence.

POPULATION: A consecutive series of about 2,000 twin index cases over 60 years of age, collected from both the residents of institutions and the general population of the State of New York and adjacent areas.

PROCEDURE: Complete life histories can be obtained on all index cases with special emphasis on length of life, senile manifestations, intellectual deterioration, general adjustment and causes of death and their possible relationships to variations in age at pubescence, mate selection, philoprogenitiveness, and occupational histories.

RESULTS: The available data show that the genetically determined physical and intellectual likenesses of monozygotic twin partners and their similarities in personality development and general adaptability have a tendency to persist throughout life and in many instances are able to remain expressed during senescence to a remarkable degree, even against the potential effect of modifying influences arising from different environmental circumstances.

CONCLUSIONS: 1. Genetically controlled capacities play a basic role in determining the variable ability to maintain a state of physical and mental health until and throughout the period of senescence.

2. The variable length of human life can be shortened either by outside factors or by inadequate utilization of constitutional potentialities, but it cannot be extended beyond the optimum limit of man's vital capacity.

3. Adjustment to the basic aspects of aging and senescence seems to be related to man's biological capacity for survival and to his adaptability to problems of life in general.

Lissy Feingold has collaborated in this study. (Slides)

1:55 PM Regression to childhood concepts in old age.

Wayne Dennis, University of Pittsburgh.

PROBLEM: To determine whether senile deterioration results in a return to childhood concepts.

POPULATION: Fifty persons, ages 50-80, residents of homes for the aged.

PROCEDURE: Piaget's test of animism as standardized by Dennis and Russell was employed to measure animistic concepts. Mental level before deterioration was estimated by the Stanford-Binet vocabulary. Present mental level was measured by the Babcock-Levy.

RESULTS: Level of animistic thinking approximated level of present functioning more closely than it approximated former mental level.

CONCLUSION: There is some regression toward earlier stages of animistic thinking in deteriorated seniles.

Betty Mallinger collaborated in this experiment.

2:10 PM The relation of dark adaptation to age. *James E. Birren, Baltimore City Hospitals.*

PROBLEM: To investigate the process of aging as manifested in changes in dark adaptation.

POPULATION: Males living in the Baltimore Infirmary. These men were all ambulatory and did not require hospitalization. Regulations for admission require that they be able to care for themselves but lack financial means to maintain themselves in the community. A total of 66 men, age 43-80, were studied. In addition, 25 Navy enlisted men, age 18-23 were used as a control group in preliminary observations.

PROCEDURE: Preliminary observations consisted of dark adaptation measurements on a Hecht Schlaer adaptometer and measurements on a low brightness scotometer developed in the United States Navy. Subsequent observations included a detailed ophthalmological examination in addition to dark adaptation measurements with dilated pupils.

RESULTS: The preliminary findings indicated that the minimum light threshold of the dark adapted eye was significantly poorer in the aged men than in the young control subjects. The central scotoma (functional blind area) was significantly larger in the aged men. Subsequent observations not only confirmed the original deficit in the older men but revealed that a large proportion of the aged men had structural defects in their eyes. The presence of structural defects was frequently associated with poor dark adaptation although a small number of men had no observable anatomical changes which might account for their poor dark adaptation. The range of individual differences was more than twice as great in aged men than in the young controls. Despite the marked average deficit in dark adaptation in the aged men, there were a few men in the individuals of advanced age group that manifested little or no impairment.

CONCLUSIONS: The light sensitivity of the human eye decreased with age although the great range of individual differences suggests that the rate of change in the function is highly variable in different individuals. Numerous structural defects may be seen in the eyes of aged persons which in many instances may account for the poor dark adaptation observed. The presence of such defects does not preclude the possibility of functional aging without manifest anatomical change.

The collaboration of Malcom Bick and Charlotte Fox is acknowledged.

SYMPOSIUM: PROBLEMS OF ADJUSTMENT IN OLD AGE

4:00 PM, Friday, Library, American Academy of
Arts and Sciences

Jointly organized with the Conference on Aging of the
American Academy of Arts and Sciences

WILLIAM MALAMUD, Chairman

BANQUET

6:30 PM, Friday, Parlor A

PSYCHOMETRIC SOCIETY

BUSINESS MEETING

11:10 AM, Wednesday, Parlor C

Symposium: Scales of Measurement

2:50 PM, Wednesday, Salle Moderne

Organized by the Division of Theoretical-Experimental Psychology, the Division of Physiological and Comparative Psychology, and the Psychometric Society.

SAMUEL A. STOUFFER, Chairman

Speakers: S. Smith Stevens, Clyde H. Coombs, Charles I. Mosier

Discussants: Harold Gulliksen, Quinn McNemar, C. F. Mosteller

PSYCHOMETRICS

1:25 PM, Thursday, Parlor B

Volunteered papers selected by the Society

JACK W. DUNLAP, Chairman

1:25 PM On the statistics of ratios. *Philip H. Du Bois, Washington University.*

A rational investigation of certain statistical properties of ratios is reported.

Let the numerator variable of a ratio be denoted as X , and the denominator variable as Y . Using Yule's formula for the mean index, which is derived on the assumption that the deviations of the variables are small in comparison with the means, it can be shown that a ratio has a mean of unity when the means of the variables are equal and when $\sigma_y = r_{xy} \sigma_x$. When these relationships obtain the ratio correlates zero with the denominator or Y -variable.

That zero correlation with the base is an important property of a ratio such as the I. Q. (in the range in which the correlation between M.A. and C.A. is linear) is readily understood. In the computation of I.Q.'s a measure of relative brightness is desired that is independent of age, the denominator variable.

Ratios meeting the criteria outlined above correlate 1.00 with scores derived by three alternative procedures for combining two scores so that the resultant score will correlate zero with the Y -variable:

1. The raw score in X divided by the predicted score in X , as found from an ordinary two-variable regression equation.

2. A difference score found when the X -variable is converted to standard scores with the arbitrary mean equal to M_y and the arbitrary standard deviation equal to σ_y/r_{xy} , and when the Y -score is subtracted from this standard score in X .

3. The series of residuals found when each X -score predicted from an ordinary regression equation is subtracted from the raw score in X .

By all of these methods the derived scores correlate $\sqrt{1 - r_{xy}^2}$ with the X -variable.

The relationship of these derived scores to partial correlation is pointed out.

Applications of these methods of computing derived scores to educational and psychological measurement are noted.

1:40 PM An item selection technique based on raw error scores. *Philip Ash and Ruth C. Ash, Pennsylvania State College.*

PROBLEM: To express the relative discriminability of each item in a test as a simple and direct function of the number of errors made by members of the tested population.

PROCEDURE: Derivation of a formula for an index of item discrimination based on distribution of errors for each item by each quarter of the tested population, including establishment of a reference value for evaluation of each item value. Also, application of the formula in the item analysis of three tests which were also item-analyzed on the basis of biserial r or the phi-coefficient, and comparison of the selectivity of the three techniques.

RESULTS: A Discrimination Index

$$\left(D.I. = \frac{4e_1 + e_2 - e_3 - 4e_4}{e} \right),$$

(where e_1, e_2, e_3, e_4 = no. of errors on the item in each quarter, e = total no. of errors on the item) was derived. A simplified data analysis sheet is presented. Comparison of the results on three tests from the use of D.I. and biserial r or the phi-coefficient showed that D.I. varies in magnitude approximately as the biserial r does. The D.I. does not, however, select all the same items and it tends to discriminate more than the other two techniques in favor of items of low difficulty. The calculation of D.I. required appreciably less time than the calculation of either the phi-coefficient or biserial r . CONCLUSIONS: A promising somewhat simpler index of item discrimination has been derived that merits experimental application to ascertain its values and limits.

1:55 PM A method for scaling ability test items in difficulty taking item unreliability into account. *Ledyard R. Tucker, Educational Testing Service.*

PROBLEM: Previous methods of scaling items in difficulty stem from the assumption that each item is a perfect measure of the common ability shared with other items being considered. This assumption has been removed in the following development.

THEORETICAL DERIVATION: Three assumptions are made:

a. Individual differences on a single ability underlie the variations in performances on all items being considered.

b. Each sample of individuals considered is normally distributed on the scale of ability.

c. The probability that individuals at each level of ability will give the correct answer to an item is related to the level of ability by the integral of a normal curve.

Two parameters can be used to characterize each item, j , the mean, t_j , and standard deviation, s_j , of the normal curve whose integral is taken in assumption c. t_j is here taken as an index of item difficulty. s_j is related to item reliability.

Consider a single sample of individuals. The origin and unit of measure on the scale of ability can be adjusted so that the sample has a zero mean and a unit standard deviation. The table of tetrachoric intercorrelations among the items should have a single factor with loadings a_i . The s_j 's and t_j 's can then be found by the equations:

$$s_j = (1 - a_j^2)/a_j^2 \\ t_j = x_j/a_j$$

where x_j is the abscissa of the point for which the area under a unit normal curve and to the right of the point is equal to the proportion of individuals in the sample who gave the correct answer to item j .

When two samples are considered, the s_j 's and t_j 's can be found for each sample separately. The s_j 's in the two samples should be proportionate and the t_j 's should be linearly related with a slope equal to the constant of proportionality of the s_j 's. These relations not only constitute a check on the applicability of this system to the items and sample being worked with, but also yield the transformation of item parameters from one sample to the other. This is important where new items are given to the second sample and it is desired to state their statistics in terms of the first sample.

2:10 PM A general approach to the problem of the population control variable. *Richard H. Gaylord and John B. Carroll, Personnel Research Section, AGO.*

INTRODUCTION: The population control variable is defined as a variable identifying sub-populations in which the application of a multiple regression equation optimum for the entire population is inappropriate. Examples of variables whose population control effect has been recognized and evaluated on a priori grounds are mentioned in illustration. Examples are drawn from the research areas of personnel selection, experimental psychology and personality dynamics. The loss of efficiency in research using a priori population control variables is demonstrated. The problem is generalized to include

first order and composite variables whose population control effect is unknown prior to analysis.

PROCEDURE: A multiple regression equation is derived including the assumption that any variable in the analysis may have population control as well as predictor effect.

CONCLUSION: On the basis of the more general regression equation derived it is shown that the inclusions of product and cross products of the variables in a multivariate analysis makes it possible to identify and use the population control effect of all crucial variables.

2:25 PM An analysis of factors in physical proficiency.

Hubert E. Brogden, Harry H. Harman, Personnel Research Section, AGO.

PROBLEM: To come to a better understanding of evaluative and predictive measures of physical proficiency.

POPULATION: A group of 217 Cadets in the Class of 1949 at the U. S. Military Academy who were enrolled in classes in physical education courses.

PROCEDURE: Thirty-one variables relating to physical proficiency were considered. These included measures of height, weight, six course grades in physical education, twenty-two tests of physical proficiency, and a rating of general physical aptitude by fellow cadets. The specific tests of physical proficiency included such measures as 300-yard run, obstacle course, dips, chins, soft ball throw, and high jump.

Product-moment correlation coefficients were computed among the 31 variables and eight centroid factors were obtained employing Thurstone's cluster centroid procedure. In attempting to rotate this preliminary solution to simple structure, it became apparent that such a final solution would involve oblique factors with implicit second-order general factors. In order to maintain the greater simplicity of an orthogonal framework, a modification was introduced in the conventional rotation procedure. This variation had the effect of combining the first-order oblique factors and the second-order general factors into an orthogonal solution approximating simple structure, but involving three additional factors.

RESULTS AND CONCLUSIONS: Eleven orthogonal factors were obtained from the analysis of thirty-one measures of physical proficiency. The factorial solution constitutes a basis for the interpretation of the factors and of the characteristics measured by the three variables.

PRESIDENTIAL ADDRESS

5:00 PM, Thursday, Assembly Room

IRVING LORGE: Words, Words, Words

BANQUET

6:00 PM, Thursday, Parlor A

MEETINGS OF RELATED GROUPS

CONFERENCE ON TRAINING OF CLINICAL
PSYCHOLOGISTS

9:00 AM to 5:30 PM, Sunday, Assembly Room

Organized by the United States Veterans Administration and the United States Public Health Service. Sponsored by the Committee on Training in Clinical Psychology of the American Psychological Association.

OPEN HOUSE: CLINICAL PSYCHOLOGISTS
OF THE VETERANS ADMINISTRATION

5:00 PM, Monday, Assembly Room

THE AMERICAN BOARD OF EXAMINERS
IN PROFESSIONAL PSYCHOLOGY

2:50 PM, Tuesday, Salle Moderne

Informal Report and Open Discussion

SOCIAL HOUR: PERSONNEL RESEARCH
SECTION, AGD

5:00 PM, Tuesday, Parlor B

INTERNATIONAL COUNCIL OF WOMEN
PSYCHOLOGISTS

7:30 PM, Tuesday, Parlor B

Open Meeting: What Should Be the Role of Women Psychologists in the Present International Crisis

ALICE I. BRYAN, Chairman

8:30 PM, Tuesday, Parlor B

Business meeting

LUNCHEON: UNIVERSITY OF WASHINGTON

12:20 PM, Friday, Cafe Rouge

LUNCHEON: THE OHIO STATE UNIVERSITY

12:20 PM, Friday, Parlor C

SYMPOSIUM: PRESENT STATUS OF VISUAL
SCIENCE IN THEORY AND PRACTICE

2:50 PM, Friday, Parlor B

Organized by the APA Delegates to the Inter-Society Color Council

HARRY HELSON, Chairman

Participants: Sidney M. Newhall, Elsie Murray, Forrest L. Dimmick, Michael J. Zigler, H. R. Blackwell, Jozef Cohen, and Robert W. Burnham.

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President-elect: William A. Hunt
Secretary: Elizabeth Duffy
Representatives:
Floyd L. Ruch, 1946
Richard M. Elliott, 1947
A. R. Gilliland, 1947
3. Division of Theoretical-Experimental Psychology
President: Clarence H. Graham
President-elect: Clark L. Hull
Secretary: Kenneth W. Spence
Representatives:
Ernest R. Hilgard, 1946
Edwin R. Guthrie, 1947
Arthur W. Melton, 1947
5. Division on Evaluation and Measurement
President: J. P. Guilford
President-elect: Robert L. Thorndike
Secretary: Robert L. Thorndike
Representatives:
Henry E. Garrett, 1945
John C. Flanagan, 1947
Quinn McNemar, 1947
6. Division of Physiological and Comparative Psychology
President: Clifford T. Morgan
President-elect: Frank A. Beach
Secretary: Harry F. Harlow
Representatives:
W. J. Brogden, 1947
7. Division on Childhood and Adolescence
President: Florence L. Goodenough
President-elect: Harold E. Jones
Secretary: T. W. Richards
Representatives:
Harold E. Jones, 1946
Roger G. Barker, 1947
Beth L. Wellman, 1947
8. Division of Personality and Social Psychology
President: Gardner Murphy
President-elect: Theodore M. Newcomb
Secretary: Ross Stagner
Representatives:
Theodore M. Newcomb, 1945
J. McV. Hunt, 1946
A. H. Maslow, 1946
R. Nevitt Sanford, 1947
9. The Society for the Psychological Study of Social Issues—a Division of the APA
President: Hadley Cantril
President-elect: Ronald Lippitt
Secretary: Eugene L. Hartley
Representatives:
Goodwin Watson, 1945
David Krech, 1947
Ruth S. Tolman, 1947
10. Division on Esthetics
President: Paul R. Farnsworth
Secretary: Norman C. Meier
Representatives:
Herbert S. Langfeld, 1945
Norman C. Meier, 1947

¹ The year of first election of each Division Representative is given.

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12. Division of Clinical and Abnormal Psychology
President: David Shakow
President-elect: David Wechsler
Secretary: David Rapaport
Representatives:
S. J. Beck, 1945
David Shakow, 1945
David Wechsler, 1945
David Rapaport, 1946
William A. Hunt, 1947
C. M. Louttit, 1947
13. Division of Consulting Psychology
President: Donald E. Super
President-elect: Morris S. Viteles
Secretary: Emily T. Burr
Representatives:
Jack Dunlap, 1947
Douglas H. Fryer, 1947
14. Division of Industrial and Business Psychology
President: George K. Bennett
President-elect: Floyd L. Ruch
Secretary: Floyd L. Ruch
Representatives:
Roger M. Bellows, 1947
Jay L. Otis, 1947
15. Division of Educational Psychology
President: Percival M. Symonds
President-elect: A. I. Gates
Secretary: Gertrude Hildreth
Representatives:
Arthur T. Jersild, 1945
Sidney L. Pressey, 1946
W. A. Brownell, 1947
16. Division of School Psychologists
President: Margaret E. Hall
President-elect: Ethel L. Cornell
Secretary: Milton A. Saffir
Representatives:
Fred Brown, 1945
Albert J. Harris, 1947
17. Division of Counseling and Guidance Psych-
gists
President: G. Frederic Kuder
President-elect: Hugh M. Bell
Secretary: Mitchell Drees
Representatives:
Hugh M. Bell, 1946
Harold Seashore, 1947
Donald E. Super, 1947
C. Gilbert Wrenn, 1947
18. Division of Psychologists in Public Service
President: Marion W. Richardson
Secretary: Beatrice J. Dvorak
Representatives:
Max L. Hutt, 1946
Marion W. Richardson, 1947
19. Division of Military Psychology
Secretary: William A. Hunt
Representatives:
(Army) Paul M. Fitts, 1946
(Navy) Steuart Henderson Britt, 1946
20. Division on Maturity and Old Age
President: Walter R. Miles
President-elect: Herbert S. Conrad
Secretary: Raymond G. Kuhlen
Representatives:
George Lawton, 1946
Walter R. Miles, 1946

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